

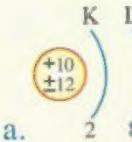
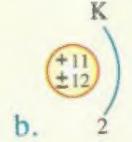
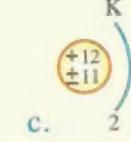
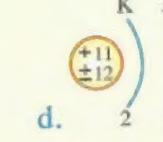
Questions ? on lesson One

● Remember ● Understand ● Apply ● Higher skills School book questions.



Interactive Exercises

1. Choose the correct answer :

- 1. The number of known elements up till now is elements.
a. 92 b. 118 c. 121 d. 211
- 2. All of these elements are metal solid elements, except
a. sodium. b. magnesium. c. mercury. d. aluminium.
- 3. All of the following are properties of metals, except
a. they are malleable and ductile.
b. they are good conductors of electricity.
c. they contain 1, 2 or 3 electrons in outermost shell.
d. they are bad conductors of heat.
- 4. All of the following are metals, except
a. iron. b. oxygen. c. copper. d. sodium.
- 5. Oxygen is from
a. acids. b. bases. c. metal elements. d. nonmetal elements.
- 6. The element which has atomic number 12 is considered from
a. metals. b. nonmetals. c. noble gases. d. no correct answer.
- 7. When an atom of an element loses one electron or more, it changes into
a. a negative ion. b. a positive ion. c. a neutral atom. d. no correct answer.
- 8. All of the following elements can form positive ions, except
a. sodium ($_{11}Na$). b. chlorine ($_{17}Cl$).
c. magnesium ($_{12}Mg$). d. aluminium ($_{13}Al$).
- 9. Which of the following figures represents the structure of sodium ion ? Fig. (.....).
a.  b.  c.  d. 

- 10. The number of energy levels in sodium ion is the number of energy levels in its atom.
a. less than b. more than c. equal to d. no correct answer



11. When an atom is changed into an ion, the is changed.

- number of protons
- number of neutrons
- number of electrons
- mass number

12. A lithium atom (Li) changes into a lithium ion (Li^+), which means that it

- gains one proton.
- gains one electron.
- loses one proton.
- loses one electron.

13. During the chemical reaction, a magnesium atom (${}_{12}\text{Mg}$) loses its outer electrons and changes into

- Mg^+
- Mg^-
- Mg^{+2}
- Mg^{-2}

14. The only nonmetal that exists in a liquid state is

- bromine.
- chlorine.
- hydrogen.
- nitrogen.

15. All of nonmetals don't conduct electricity, except

- bromine.
- aluminium.
- graphite.
- mercury.

16. In a negative ion, the number of protons is the number of electrons.

- less than
- more than
- equal to
- no correct answer

17. All of these elements can form negative ions, except

- oxygen (${}_{8}\text{O}$).
- nitrogen (${}_{7}\text{N}$).
- chlorine (${}_{17}\text{Cl}$).
- aluminium (${}_{13}\text{Al}$).

18. When a nitrogen atom (${}_{7}^{14}\text{N}$) gains electrons to complete its outer shell, it becomes

- N^{+3}
- N^{-2}
- N^{-3}
- N^-

19. The number of electrons in oxygen ion (O^{-2}) is electrons.

- 6
- 8
- 10
- 12

20. Which of the following figures represents the chloride ion (Cl^-) ? Fig. (.....).

a.

b.

c.

d.

21. The number of determines the type of element and its chemical activity.

- electrons in the outermost energy level
- levels filled with electrons
- neutrons
- protons

22. All the following are properties of inert gases, except

- they don't participate in chemical reactions.
- their outermost electron shells are completely filled.
- they form negative ions.
- their molecules consist of one single atom.

23. All of these elements can participate in chemical reactions, except
a. sodium (₁₁Na). b. neon (₁₀Ne). c. hydrogen (₁H). d. nitrogen (₇N).

24. The molecule of a noble gas consists of
a. two different atoms. b. one atom.
c. two similar atoms. d. one or two similar atoms.

25. During the formation of a sodium chloride molecule, sodium atom
a. gains one electron from chlorine atom.
b. gives one electron to chlorine atom.
c. gains two electrons from chlorine atom.
d. gives two electrons to chlorine atom.

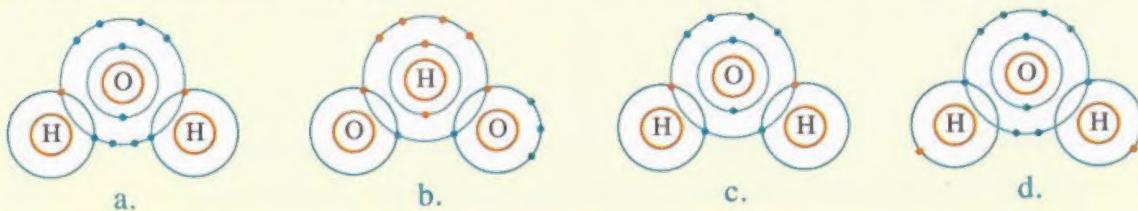
26. During the formation of a magnesium oxide molecule, oxygen atom changes into
a. positive ion and carries one positive charge.
b. negative ion and carries one negative charge.
c. positive ion and carries two positive charges.
d. negative ion and carries two negative charges.

27. The bond in a sodium chloride molecule is bond.
a. single covalent b. double covalent c. triple covalent d. ionic

28. The covalent bond usually arises between elements.
a. two metallic b. two nonmetallic
c. metallic and nonmetallic d. metallic and noble

29. All of the following are examples of single covalent bonds, except
a. H_2 b. HCl c. N_2 d. H_2O

30. Which of the following figures represents the molecule of water ? Fig.(.....).



31. All of the following are covalent molecules, except
a. H_2O b. MgO c. HCl d. O_2

32. The covalent bond in an oxygen molecule is a bond.
a. single b. double c. triple d. no correct answer

33. There is a triple covalent bond in molecule.
a. hydrogen b. chlorine c. oxygen d. nitrogen



2. Put (✓) or (✗) in front of the following statements and correct the wrong ones :

- 1. All metals are solids except mercury which is a liquid. ()
- 2. Metals tend to lose electrons and convert into negative ions. ()
- 3. Sodium, magnesium and aluminium can form positive ions. ()
- 4. In a positive ion, the number of electrons is greater than the number of protons. ()
- 5. Nonmetals have more than four electrons in their outer shells. ()
- 6. Metals are malleable and ductile, while nonmetals are not. ()
- 7. The outermost energy level of sodium ion (Na^+) has one electron. ()
- 8. Graphite is the only nonmetal that conducts electricity. ()
- 9. The molecules of noble gases are diatomic molecules. ()
- 10. Ionic bond arises between two nonmetals. ()
- 11. The bond in sodium chloride is a single covalent bond. ()
- 12. During the formation of a magnesium oxide molecule, a magnesium atom gains two electrons from oxygen atom. ()
- 13. Magnesium oxide is an ionic compound. ()
- 14. In an ionic bond, the metal atom gives electrons to the nonmetal atom. ()
- 15. The bond in a hydrogen molecule is a double covalent bond. ()
- 16. Each atom in an oxygen molecule shares by two electrons. ()
- 17. The bond in a nitrogen molecule is a triple covalent bond. ()
- 18. In a covalent bond, the two nonmetal atoms do not lose or gain electrons. ()
- 19. The bond in water molecule is an ionic bond. ()

3. Write the scientific term of each of the following :

- 1. Elements have luster, good conductors of heat and electricity and they contain less than (4) electrons in their outer electron shells.
- 2. The only metal that exists in a liquid state.
- 3. Elements that may be solids, liquids or gases and having no luster, bad conductors of heat and electricity and containing more than (4) electrons in their outer electron shells.
- 4. The only nonmetal that exists in a liquid state.
- 5. The only nonmetal that conducts electricity.
- 6. An atom that has lost an electron or more during the chemical reaction.
- 7. An atom gained one electron or more during the chemical reaction.
- 8. An atom of an element that gives or gains an electron or more during the chemical reaction.
- 9. An atom of an element that neither loses nor gains any electrons.
- 10. Elements whose outermost shells are completely filled with electrons.

- 11. A bond resulting from the electric attraction between a positive ion and a negative ion.
- 12. • The bond that is formed between magnesium and oxygen atoms.
 - The chemical bond originated between two elements have atomic numbers 11 and 17.
- 13. A bond that is formed between two nonmetals with sharing of electrons.
- 14. A bond arises between two hydrogen atoms, where each atom shares with one electron.
- 15. A bond that is resulted from the sharing of each atom with two electrons.
- 16. • A bond that is formed between two nonmetals through sharing of each atom by three electrons.
 - A bond resulting from the participation of each of the two atoms with three electrons.

4. Complete the following statements :

- 1. The number of known elements up till now is elements.
- 2. Elements are classified according to their properties and electronic structure into and
- 3. Metals have less than electrons in their outermost shell.
- 4. All metals are except which is a liquid.
- 5. elements are good conductors of heat and electricity.
- 6. Atoms of tend to lose an electron or more during the chemical reaction and change into ions.
- 7. and atoms are examples of metal atoms.
- 8. During the chemical reaction, a sodium atom ($^{23}_{11}\text{Na}$) one electron and changes into ion.
- 9. The number of electrons in the outermost shell of a magnesium ($^{24}_{12}\text{Mg}$) atom is , while that of a magnesium ion is
- 10. Nonmetals have than 4 electrons in their outermost shell.
- 11. Some nonmetals are gases as and others are solids as
- 12. All nonmetals are conductors of electricity except which is conductor of electricity.
- 13. Elements of have luster, while elements of do not have luster.
- 14. Elements of are malleable and ductile, while elements of are not malleable or ductile.
- 15. is the only liquid metallic element, while is the only liquid nonmetallic element.
- 16. A nitrogen atom contains electrons, while a nitrogen ion contains electrons.
- 17. The symbol of an oxygen ion is , while that of a sodium ion is
- 18. The number of energy levels in an atom of element is equal to the number of energy levels in its ion, while the number of energy levels in an atom of element is more than the number of energy levels in its ion.
- 19. An atom of doesn't lose or gain any electrons under ordinary conditions.



- 20. elements do not participate in chemical reactions in ordinary conditions as the outer shell is filled with
- 21. An ionic bond arises between and elements.
- 22. An ionic bond resulted from the electric attraction between and
- 23. During the formation of sodium chloride, (₁₇Cl) atom one electron and changes into ion.
- 24. During the formation of (MgO) molecule, atom loses electrons which are gained by atom.
- 25. and are examples of ionic compounds.
- 26. Covalent bonds are formed between two elements.
- 27. In bond, the atoms don't lose or gain any electrons.
- 28. The chemical bond in a magnesium oxide molecule is bond, while the bond in oxygen molecule is bond.
- 29. The bond in sodium chloride molecule is bond, whereas the bonds in water molecule are bonds.
- 30. An oxygen atom two electrons during the formation of a magnesium oxide molecule, while it two electrons during the formation of an oxygen molecule.
- 31. The types of covalent bonds are , and
- 32. The bond in a hydrogen molecule is a bond, while the bond in a nitrogen molecule is a bond.

5. Complete the following tables :

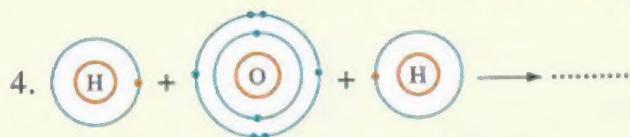
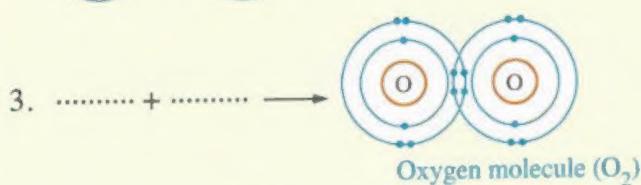
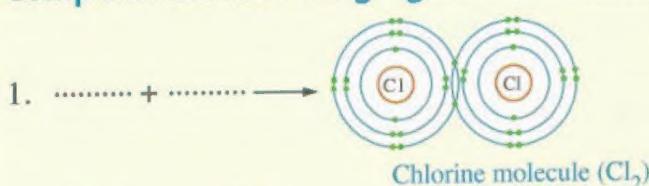
A

| Element | Electronic configuration | | | | No. of protons | Its type | No. of electrons in ion | Type of ion | Symbol of its ion |
|---------------------|--------------------------|-------|-------|-------|----------------|----------|-------------------------|-------------|-------------------|
| | K | L | M | N | | | | | |
| 1. ₁₂ Mg | | | | | | | | | |
| 2. ₁₅ P | | | | | | | | | |
| 3. ₁₈ Ar | | | | | | | | | |
| 4. ₁₇ Cl | | | | | | | | | |
| 5. ₁₉ K | | | | | | | | | |

B

| Atom | Electronic configuration | | | Molecule | Type of bond |
|---------------------|--------------------------|-------|-------|--------------|--------------|
| | K | L | M | | |
| 1. $_{11}\text{Na}$ | | | | NaCl | ..... |
| $_{17}\text{Cl}$ | | | | | |
| 2. $_{12}\text{Mg}$ | | | | MgO | ..... |
| $_{8}\text{O}$ | | | | | |
| 3. $_{7}\text{N}$ | | | | N_2 | ..... |
| 4. $_{8}\text{O}$ | | | | O_2 | ..... |

6. Complete the following figures and write the type of the bond :



7. Give reasons for :

1. The number of electrons of an ion differs from that of its atom.
2. When an atom loses an electron or more, it becomes a positive ion.
3. When an atom gains an electron or more, it becomes a negative ion.
4. The number of energy levels in the ion of a metallic element is less than the number of energy levels in its atom.
5. A sodium atom ($_{11}\text{Na}$) tends to form a positive ion, while oxygen atom ($_{8}\text{O}$) tends to form a negative ion.
6. Noble gases don't participate in chemical reactions under the ordinary conditions.
7. Both sodium ion and oxygen ion have the same number of electrons.
8. The bond in a molecule of magnesium oxide (MgO) is an ionic bond [regarding that the atomic number for magnesium (Mg) = 12 and oxygen (O) = 8].



9. It is impossible to combine sodium and magnesium together to form a compound.
10. Ionic bonds produce compounds only not elements, but the covalent bonds may produce both types an element or even a compound.
11. When an atom of chlorine ($_{17}\text{Cl}$) is joined with an atom of sodium ($_{11}\text{Na}$), the product will be an ionic compound, but when two atoms of chlorine are joined together, the product will be a covalent molecule.
12. The bond in a hydrogen (H_2) molecule is a single covalent bond.
13. The bond in an oxygen (O_2) molecule is a double covalent bond.
14. The bond in a water (H_2O) molecule is a single covalent bond.
15. The bond in a nitrogen ($_{7}\text{N}$) molecule is a triple covalent bond.

8. What is meant by ... ?

| | | |
|--|---|--|
| 1. Metals. | 2. Nonmetals. | 3. <input checked="" type="checkbox"/> Positive ion. |
| 4. <input checked="" type="checkbox"/> Negative ion. | 5. <input checked="" type="checkbox"/> The ion. | 6. Noble (inert) gases. |
| 7. Ionic bond. | 8. Covalent bond. | 9. Single covalent bond. |
| 10. Double covalent bond. | | 11. Triple covalent bond. |

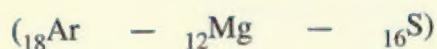
9. What happens when ... ?

1. You hammer a piece of carbon and why ?
2. An atom loses one electron or more.
3. An atom gains one electron or more.
4. An oxygen atom combines with a magnesium atom.
5. A chlorine atom combines with a hydrogen atom.
6. Two oxygen atoms combine together.

10. Choose the odd word (or symbol) out, then mention the scientific name of the rest :

1. Magnesium / Sodium / Mercury / Aluminium.
2. $_{17}\text{Cl}$ / $_{20}\text{Ca}$ / $_{19}\text{K}$ / $_{11}\text{Na}$
3. $_{12}\text{Mg}$ / $_{11}\text{Na}$ / $_{4}\text{Be}$ / $_{20}\text{Ca}$
4. Hydrogen / Oxygen / Nitrogen / Graphite.
5. Oxygen / Nitrogen / Chlorine / Sodium.
6. $_{9}\text{F}$ / $_{16}\text{S}$ / $_{5}\text{B}$ / $_{15}\text{P}$
7. $_{2}\text{He}$ / $_{18}\text{Ar}$ / $_{11}\text{Na}$ / $_{10}\text{Ne}$
8. Nitrogen molecule / Table salt molecule / Hydrogen molecule / Oxygen molecule.

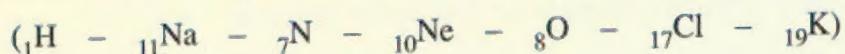
11.  Write down the electronic configuration of the atoms of the following elements :



Then indicate :

1. The type of each atom (Metal – Nonmetal – Noble).
2. The type of each ion (Positive – Negative – Has no ions).

12. Write the electronic configuration of each of the following atoms :



Then indicate :

1. The type of each element (Metal – Nonmetal – Noble gas).
2. The type of ion for each of them (Positive – Negative – No ions).
3. How the bond is formed between :
 - a) Two hydrogen atoms.
 - b) Two nitrogen atoms.
4. The element that has no ability to form a bond is (Complete).

13. Compare between :

1.  An atom and an ion.
2.  Metals and nonmetals.
3. Mercury and bromine [According to : Type of element – Physical state – Luster].
4. Aluminium and graphite [According to : Electric conduction – Heat conduction – Ability to malleable and ductile].
5.  Positive ion and negative ion.
6.  Ionic bond and covalent bond.
7. Single, double and triple covalent bonds.

14. Mention one difference between :

1. Graphite and oxygen.
2. (Na) and (Na⁺).
3. (O₂) and (2O).

15. Mention the properties of :

1. Metals.
2. Nonmetals.

16.  You see one of the iron smiths hitting a rod of iron without being broken, but if somebody hits a piece of coal, it will be easily broken into pieces. How do you explain ?



17. Draw a diagram showing the electronic configuration of the atom of oxygen (${}_{8}^{16}\text{O}$), then show how two of its atoms are bonded to form oxygen molecule (O_2).

18. Show by drawing the combination between each of the following and mention the type of bond.

1. Hydrogen (${}_{1}\text{H}$) and oxygen (${}_{8}\text{O}$) to form water molecule.
2. Magnesium (${}_{12}\text{Mg}$) and oxygen (${}_{8}\text{O}$) to form magnesium oxide molecule.
3. Oxygen (${}_{8}\text{O}$) and calcium (${}_{20}\text{Ca}$) to form calcium oxide molecule.
4. Sodium atom (${}_{11}\text{Na}$) and chlorine atom (${}_{17}\text{Cl}$) to form sodium chloride molecule.
5. Two hydrogen atoms (${}_{1}\text{H}$) to form hydrogen molecule.
6. Two nitrogen atoms (${}_{7}\text{N}$) to form nitrogen molecule.

19. The following figures represent some atoms. Answer the following questions :

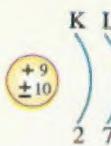


Fig. (a)



Fig. (b)



Fig. (c)



Fig. (d)

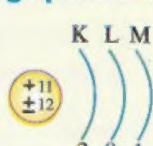


Fig. (e)

1. Find the type of element and ion if it is present of each of them.
2. Find the No. of electrons which lost or gained during the chemical reactions in each of them.
3. Which of these atoms is a good conductor of heat and electricity.

20. The following figures represent three molecules, whose atoms combine together by covalent bonds.



Fig. (a)



Fig. (b)



Fig. (c)

- Which of these figures represents :

1. Hydrogen molecule.
2. Oxygen molecule.
3. Nitrogen molecule.

21. Two elements (X and Y) have atomic numbers (11 and 17) respectively :

1. Show by drawing how the chemical bond is formed between them.
2. What is the type of this bond ?

Thinking Skills Questions

1. Choose the correct answer :

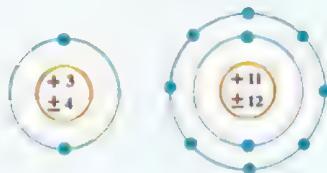
1. The cables of electric wires are made up of an element, whose atomic number is

a. 10 b. 7 c. 13 d. 17

2. From the opposite two figures :

The charge of each of the two ions is

a. -2 b. -1 c. +1 d. +2



3. The number of electrons in the outermost energy level of oxygen ion equals the number of electrons in the outermost energy level of

a. ${}_{20}^{40}\text{Ca}$ ion. b. ${}_{7}^{14}\text{N}$ atom. c. ${}_{17}^{35}\text{Cl}$ atom. d. ${}_{16}^{32}\text{S}$ atom.

4. The electronic configuration of potassium (${}_{19}\text{K}$) ion is similar to the electronic configuration of ion.

a. ${}_{8}\text{O}$ b. ${}_{11}\text{Na}$ c. ${}_{18}\text{Ar}$ d. ${}_{17}\text{Cl}$

5. The element, whose atomic number is forms an ionic bond with oxygen.

a. 2 b. 10 c. 12 d. 16

6. Nonmetal element its nucleus contains 18 neutrons , its electrons revolve in 3 energy levels and it tends to gain one electron during chemical reactions, its mass No. equal

a. 17 b. 18 c. 35 d. 40

2. The following figures represent the electronic configuration of the outermost energy level of four atoms of elements, whose electrons revolve in three energy levels.



Answer the following questions :

- What are the elements which are considered from metals ?
- What is the element which forms an ion from the type (M^{+3}) ?
- What is the type of the ion which the element (R) forms ? (Give a reason).
- What is the element, whose nucleus contains 11 protons ? (Give a reason).



3. Give reasons for :

1. Jewellery is made up of some metallic elements.
2. Some metals are used in manufacturing some cooking pots.

4. "A , B , C and D" are four elements, whose atomic numbers are "1 , 11 , 10 and 17 " respectively.

1. Classify them into metal, nonmetal and noble gas.
2. Show by drawing how two atoms of (A) form a covalent bond.
3. What is the type of bond when (B) combines with (D) ?
4. What is the type of bond when two atoms of (D) combine together ?
5. Explain why element (C) doesn't undergo chemical reaction under normal conditions ?

5. Two elements (₈A) & (₁₂B) :

1. Which one is a metal and which one is a nonmetal ?
2. What is the kind of bond formed between the two atoms of (A) ? Show by drawing.
3. Show by drawing the bond formed between (A) and (B) elements and mention the name of the formed compound.

6. Show the electronic configuration of the following atoms, then mention the atomic number and the type of element for each one :

1. An element atom that gains two electrons in the outermost energy level (L) during the chemical reaction.
2. An element atom whose electrons distribute in 4 energy levels and its ion carries one positive charge.
3. An element atom whose electrons distribute in 3 energy levels and the symbol of its ion is (X⁻³).
4. An element atom loses two electrons during the chemical reaction, so (M) level becomes the outermost energy level of its ion.

Questions ? on lesson Two

● Remember ● Understand ● Apply ● Higher skills ● School book questions.



Interactive Exercises

1. Choose the correct answer :

1. elements are the most stable elements.
a. Metals b. Nonmetals c. Noble gases d. Metalloids
2. When a nonmetal gains or shares by two electrons, its valency will be
a. monovalent. b. divalent. c. trivalent. d. tetravalent.
3. All of the following elements are monovalent, except
a. hydrogen. b. sodium. c. oxygen. d. chlorine.
4. All of the following elements are divalent, except
a. ₁₂Mg b. ₇N c. ₈O d. ₁₆S
5. When an atom loses, gains or shares with one electron, whose valency is
a. monovalent. b. divalent. c. trivalent. d. tetravalent.
6. The valency of ferrous is
a. monovalent. b. divalent. c. trivalent. d. tetravalent.
7. All of the following are nonmetals having more than one valency, except
a. copper. b. phosphorus. c. sulphur. d. nitrogen.
8. In trivalent elements, the outermost energy level contains electrons.
a. (3) or (5) b. (5) or (6) c. (7) or (1) d. (6) or (3)
9. The valency of argon (₁₈Ar) is
a. trivalent. b. divalent. c. monovalent. d. zero.
10. The valency of copper in (Cu₂O) is
a. monovalent. b. divalent. c. trivalent. d. tetravalent.
11. The chemical formula of carbonate group is
a. (NO₃)⁻ b. (SO₄)²⁻ c. (NH₄)⁺ d. (CO₃)²⁻
12. All of the following are monovalent atomic groups, except group.
a. phosphate b. nitrate c. hydroxide d. bicarbonate
13. Which of the following is a trivalent atomic group ?
a. Hydroxide. b. Sulphate. c. Ammonium. d. Phosphate.
14. Nitrate and nitrite groups are different in the
a. type of atoms. b. number of atoms. c. valency. d. type of charge.
15. Phosphate and sulphate groups are similar in the
a. type of atoms. b. valency. c. number of atoms. d. no correct answer.



16. The nitrate group is a group.

- monovalent
- divalent
- trivalent
- tetravalent

17. All of these atomic groups carry the same charge, except

- nitrite.
- nitrate.
- bicarbonate.
- ammonium.

18. The molecules of sodium hydroxide, water and sulphuric acid share in the presence of in each of them.

- hydrogen and nitrogen
- oxygen and sodium
- hydrogen and oxygen
- hydrogen and sodium

19. The chemical formula of carbon dioxide(CO_2) shows that the valency of carbon is

- monovalent.
- divalent.
- trivalent.
- tetravalent.

20. Element (M) forms a compound M(OH)_3 so, its valency is

- monovalent.
- divalent.
- trivalent.
- tetravalent.

21. The chemical formula of calcium bicarbonate is

- CaCO_3
- $\text{CaH}(\text{CO}_3)_2$
- $\text{Ca}(\text{HCO}_3)_2$
- Ca_2HCO_3

22. Each aluminium atom (^{13}Al) combines with atoms of chlorine (^{17}Cl) to form aluminium chloride molecule.

- two
- three
- four
- five

23. The chemical formula of sodium hydroxide is

- NaOH
- NaCO_3
- NaHCO_3
- $\text{Na}_2(\text{CO}_3)_2$

24. The chemical formula of sulphuric acid is

- H_2O
- HCl
- H_2SO_4
- HNO_3

25. Sulphuric acid is composed of

- five atoms of three different elements.
- six atoms of three different elements.
- seven atoms of three different elements.
- eight atoms of four different elements.

26. In ammonia molecule (NH_3), the number 3 refers to the number of

- N & H atoms in one molecule.
- H atoms in one molecule.
- the valency of hydrogen.
- N atoms in one molecule.

27. The chemical formula of sodium nitrite is

- NaNO
- NaNO_3
- NaNO_2
- Na_2NO_3

28. In the compound $\text{X}(\text{NO}_3)_2$, the valency of element (X) is

- monovalent.
- divalent.
- trivalent.
- tetravalent.

29. The number of atoms in ammonium nitrate molecule equals

- 5
- 7
- 8
- 9

30. When an acid dissolves in water, it produces ions.

a. $(OH)^+$ b. H^- c. H^+ d. $(OH)^-$

31. When an alkali (base) dissolves in water, it gives ions.

a. H^+ b. $(OH)^-$ c. $(OH)^{-2}$ d. $(OH)^+$

32. All of these substances turn litmus paper into red, except

a. HCl b. HNO_3 c. $NaOH$ d. H_2SO_4

33. Mona bought a cup of yogurt and found the taste is sour, so she concluded that it contains a compound from

a. acids. b. bases. c. salts. d. oxides.

34. All of these substances turn litmus paper into blue, except

a. $NaOH$ b. KOH c. $Ca(OH)_2$ d. HBr

35. All of the aqueous solutions of the following compounds have bitter taste, except

a. sodium hydroxide. b. sulphuric acid.

c. calcium hydroxide. d. potassium hydroxide.

36. All of these are nonmetal oxides, except

a. CO_2 b. P_2O_5 c. SO_3 d. Al_2O_3

37. Sodium chloride is

a. an acid. b. an oxide. c. a base. d. a salt.

38. The salt that is formed on the combination of a positive metal ion with a negative atomic group is

a. $NaCl$ b. Na_2CO_3 c. $(NH_4)_2SO_4$ d. $NaBr$

39. On the combination of $(Mg)^{+2}$ ion with $(CO_3)^{-2}$ group, is formed.

a. an acid b. a base c. an oxide d. a salt

40. The salt that is formed on the combination of a positive atomic group with a negative atomic group is

a. NH_4Cl b. $(NH_4)_2CO_3$ c. Na_2SO_4 d. NH_4Br

41. Ammonium chloride salt is formed on the combination of

a. a positive metal ion with a negative atomic group.

b. a positive metal ion with a negative nonmetal ion.

c. a negative nonmetal ion with a positive atomic group.

d. a negative nonmetal ion with a negative nonmetal ion.

42. All of these salts dissolve in water, except

a. sodium chloride. b. potassium sulphate.

c. silver chloride. d. sodium sulphide.



2. Choose from column (B) what suits it in column (A) :

| (A) | (B) |
|-------------------------|-----------------------|
| 1. $(\text{PO}_4)^{-3}$ | a. Nitrate group. |
| 2. $(\text{OH})^-$ | b. Bicarbonate group. |
| 3. $(\text{CO}_3)^{-2}$ | c. Nitrite group. |
| 4. $(\text{NO}_3)^{-}$ | d. Sulphate group. |
| 5. $(\text{SO}_4)^{-2}$ | e. Carbonate group. |
| 6. $(\text{HCO}_3)^{-}$ | f. Ammonium group. |
| 7. $(\text{NO}_2)^{-}$ | g. Phosphate group. |
| 8. $(\text{NH}_4)^+$ | h. Hydroxide group. |

3. Choose from columns (B) & (C) what suit them in column (A) :

| 1 | (A) | (B) | (C) |
|------------------------|----------------------------|---|-----|
| 1. Sulphuric acid | a. KOH | A. A salt dissolves in water. | |
| 2. Sodium sulphide | b. H_2SO_4 | B. Its solution changes the colour of litmus paper into blue. | |
| 3. Lead iodide | c. Na_2S | C. Its solution changes the colour of litmus paper into red. | |
| 4. Potassium hydroxide | d. PbI_2 | D. A salt doesn't dissolve in water. | |

| 2 | (A) | (B) | (C) |
|----|---------------|-----------------------|-----------------------------|
| | (Common name) | (Chemical name) | (Chemical formula) |
| 1. | Caustic soda | a. Sodium hydroxide. | A. NaCl |
| 2. | Table salt | b. Calcium hydroxide. | B. NaOH |
| 3. | Limewater | c. Sodium chloride. | C. $\text{Ca}(\text{OH})_2$ |

4. Put (✓) or (✗) in front of the following statements and correct the wrong ones :

- 1. An element of atomic number 20, so its valency is divalent. ()
- 2. Ferrous carries three negative charges. ()
- 3. Water molecule consists of four atoms for two elements. ()
- 4. The valency of noble gases is monovalent. ()
- 5. The atomic group acts as a compound in the chemical reaction. ()

- 6. Both nitrate and nitrite groups have the same valency. ()
- 7. The chemical formula indicates the type and the number of atoms in a certain molecule. ()
- 8. The chemical formula of carbonate group is $(\text{HCO}_3)^-$ ()
- 9. In the compound (XY_2) , (Y) is divalent and (X) is monovalent. ()
- 10. A compound (X_2O_3) , so the valency of element (X) is monovalent. ()
- 11. Both lithium bicarbonate and sodium carbonate have the same number of atoms. ()
- 12. The molecule of sodium sulphate consists of three different elements. ()
- 13. The chemical formula of calcium carbonate is (CaCO_3) . ()
- 14. The chemical formula of aluminium sulphate is $\text{Al}_3(\text{SO}_4)_2$ ()
- 15. (SO_2) is the symbol of sodium oxide. ()
- 16. The chemical formula of silver nitrate is (AgNO_3) ()
- 17. The valency of sodium in (NaCl) is monovalent, while it is divalent in (Na_2CO_3) . ()
- 18. Table salt is formed of two divalent elements. ()
- 19. The chemical formula of calcium hydroxide molecule is (CaOH) . ()
- 20. The chemical formula of nitric acid is (HNO_3) , while that of sulphuric acid is (H_2S) . ()
- 21. The valency of sulphur in sulphur trioxide (SO_3) is tetravalent. ()
- 22. Oxides are substances that dissociate in water producing positive hydrogen ions. ()
- 23. Sodium hydroxide changes the colour of litmus paper into red. ()
- 24. Mineral acids are formed when hydrogen joined with a negative atomic group except nitrate group. ()
- 25. When an element $(_{11}\text{Z})$ combines with oxygen, it produces (ZO) oxide which is a metal oxide. ()
- 26. Aluminium oxide is a metal oxide, while carbon dioxide is a nonmetal oxide. ()
- 27. Caustic soda and limewater are from bases, while magnesium carbonate is from salts. ()
- 28. The combination of metals with oxygen form oxides, while the combination of metals with nonmetals form bases. ()
- 29. Sodium chloride is considered a base. ()
- 30. Silver chloride is water soluble, while sodium chloride is water insoluble. ()

5. Write the scientific term of each of the following :

- 1. The number of electrons gained, lost or even shared with an atom during a chemical reaction.
- 2. Elements, their valencies are zero.



- 3. A set of atoms joined together, behave like one atom only, having a certain valency and it can't be existed solely.
- 4. A formula represents the number and the type of atoms in a molecule.
- 5. Compounds are dissolved (dissociated) in water producing positive hydrogen ions H^+ .
 - Compounds have sour taste and turn litmus paper into red.
- 6. Compounds (substances) are dissociated in water producing negative hydroxide ions $(OH)^-$.
 - Compounds have bitter taste and turn litmus paper into blue.
- 7. Compounds resulted from the combination between oxygen and an element even though it is a metal or a nonmetal.
- 8. Oxides produced due to the combination of oxygen with a metal.
- 9. Oxides produced due to the combination of oxygen with a nonmetal.
- 10. Compounds produced as a result of the chemical combination of a positive metal ion (or a positive atomic group) with a negative atomic group (or a negative nonmetal ion except oxygen).

6. Complete the following statements :

- 1. The valency of metals may be , or trivalent as their outermost energy shells have 1 , 2 or 3 electrons.
- 2. The valency of aluminium ($^{27}_{13} Al$) is , while that of calcium ($^{40}_{20} Ca$) is
- 3. Some metallic elements have more than one valency, such as and
- 4. The valency of iron is in ferrous chloride, while in ferric chloride is
- 5. Some nonmetallic elements have more than one valency such as , and
- 6. The valency of a sulphur atom may be , or
- 7. Phosphorus element has two valencies which are and
- 8. The valency of noble gases is as their outermost energy level is with electrons.
- 9. The valency of ($^{39}_{19} K$) is , while the valency of $(SO_4)^{2-}$ is
- 10. and are examples of monovalent atomic groups, while and are examples of divalent atomic groups.
- 11. The valency of a carbonate group is , while that of a bicarbonate group is
- 12. The symbol of phosphate group is and its valency is
- 13. The symbol of sulphate group is and it is formed of atoms of different elements.

- 14. The difference between nitrate group and nitrite group is one atom.
- 15. The chemical formula of sodium carbonate is and it consists of atoms of different elements.
- 16. If the chemical formula of aluminium sulphate is $\text{Al}_2(\text{SO}_4)_3$, so the valency of aluminium atom is , while the valency of sulphate group is
- 17. The chemical formula of magnesium sulphate is , while that of calcium nitrate is
- 18. The chemical formula of hydrochloric acid is , but the chemical formula of sodium hydroxide is
- 19. The chemical formula of water is , but the chemical formula of sulphuric acid is
- 20. A compound has a chemical formula (XO_2), so the valency of (X) is
- 21. The valency of calcium is and when it combines with phosphate group, a compound is formed its formula is
- 22. (Na_2O) is the chemical formula of , while the chemical formula of magnesium carbonate is
- 23. The valency of sodium in sodium carbonate (Na_2CO_3) is and its valency in sodium chloride (NaCl) is
- 24. Compounds are classified according to their properties into , bases, and
- 25. On dissolving in water, acids give positive ions and alkalis give negative ions.
- 26. Acids have taste and change the colour of litmus paper into , while bases have taste and change the colour of litmus paper into
- 27. and are examples of bases.
- 28. is from acids that contains oxygen, while is from acids that doesn't contain oxygen.
- 29. (H_2SO_4) is , while (NaOH) is
- 30. The symbols of all mineral acids begin with atom, while the symbols of all bases end with group.
- 31. is an example of metal oxides, while is an example of nonmetal oxides.
- 32. Sodium sulphide is from the salts that in water, while lead sulphate is from the salts that in water.



7. Complete the following table :

| Compound | Chemical formula | No. of atoms in the molecule | No. of elements forming the molecule | Its type |
|------------------------|------------------------------|------------------------------|--------------------------------------|----------|
| 1. Sodium carbonate | ..... | ..... | ..... | ..... |
| 2. | CuCO_3 | ..... | ..... | ..... |
| 3. Sodium hydroxide | ..... | ..... | 3 | ..... |
| 4. | $\text{Al}_2(\text{SO}_4)_3$ | 17 | ..... | ..... |
| 5. Calcium oxide | ..... | ..... | ..... | ..... |
| 6. | $\text{Mg}(\text{NO}_3)_2$ | ..... | 3 | ..... |
| 7. Copper nitrite | ..... | ..... | ..... | ..... |
| 8. Aluminium hydroxide | ..... | 7 | ..... | ..... |
| 9. | CaCO_3 | ..... | ..... | ..... |
| 10. Sulphuric acid | ..... | ..... | ..... | ..... |
| 11. | MgO} | ..... | ..... | ..... |
| 12. Sodium phosphate | ..... | ..... | ..... | ..... |

8. Give reasons for :

1. Potassium (₁₉K) is monovalent, while oxygen (₈O) is divalent.
2. Both sodium (₁₁Na) and chlorine (₁₇Cl) are monovalent although they have different atomic numbers.
3. The valency of noble gases is zero.
4. Magnesium (₁₂Mg) is divalent, while aluminium (₁₃Al) is trivalent.
5. An oxygen atom combines with two atoms of sodium when composing one molecule of sodium oxide.
6. The chemical formula of sodium carbonate is (Na_2CO_3).
7. The chemical formula of water is (H_2O).
8. Acids have an effect on litmus paper which is different from bases.
9. All acids turn the colour of litmus into red and having a sour taste, while all bases turn the colour of litmus into blue with a bitter taste.
10. We can obtain sodium chloride (NaCl) solution and not silver chloride (AgCl) solution.
11. Caustic soda is from bases, while lead bromide is from salts.

9. What is meant by each of the following ... ?

1. Valency.
2. Magnesium ($_{12}Mg$) is a divalent element.
3. Fe^{+3}
4. A trivalent nonmetallic element.
5. Atomic group.
6. Chemical formula.
7. Acids.
8. Bases.
9. Oxides.
10. Metal oxides.
11. Nonmetal oxides.
12. Salts.

10. Choose the odd word (or formula) and mention the relation between the rest :

1. Lithium / Silver / Aluminium / Sodium.
2. Calcium / Magnesium / Lead / Oxygen.
3. Phosphorus / Nitrogen / Sulphur / Chlorine.
4. Bromine / Chlorine / Iodine / Potassium.
5. Zinc / Calcium / Mercury / Aluminium / Lead.
6. Ammonium / Phosphate / Carbonate / Nitrate.
7. $NaOH$ / $Ca(OH)_2$ / KOH / HCl
8. Al_2O_3 / SO_3 / SO_2 / CO_2
9. K_2O / Al_2O_3 / SO_3 / CaO
10. H_2O / HBr / HCl / HNO_3
11. $NaCl$ / K_2SO_4 / $AgCl$ / Na_2S

11. Give an example of each of the following :

1. A monovalent metallic element.
2. A monovalent nonmetallic element.
3. A divalent nonmetallic element.
4. A trivalent nonmetallic element.
5. An element, its valency is zero.
6. A monovalent atomic group.
7. A trivalent atomic group.
8. A divalent atomic group.
9. A base.
10. An acid doesn't contain oxygen.
11. A metal oxide.
12. An acid contains oxygen.
13. A salt doesn't dissolve in water.
14. A salt dissolves in water.
15. A compound turns the red litmus paper into blue.

12. Write the names of the following compounds and mention the number of atoms for each :

| | | |
|--------------|---------------|---------------|
| 1. $CaSO_4$ | 2. $LiHCO_3$ | 3. $Mg(OH)_2$ |
| 4. H_2SO_4 | 5. Na_3PO_4 | 6. KNO_3 |



7. $\text{Mg}_3(\text{PO}_4)_2$
 10. NaNO_3
 13. CaCO_3

8. CO_2
 11. $\text{Ca}(\text{OH})_2$
 14. HCl

9. $\text{Al}_2(\text{SO}_4)_3$
 12. $\text{Ca}_3(\text{PO}_4)_2$

13. Write the chemical formula for the following compounds :

1. Sodium hydroxide.
 4. Copper nitrate.
 7. Sulphuric acid.
 9. Calcium bicarbonate.
 12. Potassium chloride.
 15. Calcium nitrate.
 18. Hydrochloric acid.
 21. Aluminium hydroxide.
 24. Sodium carbonate.
 27. Sulphur trioxide.

2. Sodium bicarbonate.
 5. Magnesium oxide.
 8. Calcium hydroxide (Limewater).
 10. Calcium sulphate.
 13. Copper sulphate.
 16. Silver nitrate.
 19. Table salt.
 22. Ammonium chloride.
 25. Sodium oxide.
 28. Water.

3. Sodium sulphate.
 6. Nitric acid.
 11. Iron II (ferrous) oxide.
 14. Aluminium oxide.
 17. Silver chloride.
 20. Calcium chloride.
 23. Potassium sulphate.
 26. Potassium carbonate.

14. Mention the properties of :

1. Acids.
 2. Bases.

15. Identify the type of the following compounds :

| | | | |
|------------------|---------------------------|--------------------|-----------------------------|
| 1. KOH | 2. NaCl | 3. MgO | 4. H_2SO_4 |
| 5. CO_2 | 6. NH_4Cl | 7. HBr | 8. $\text{Ca}(\text{OH})_2$ |
| 9. SO_3 | 10. PbSO_4 | 11. HNO_3 | 12. PbBr_2 |

16. Compare between :

1. Acids and bases [giving examples of each].
2. Carbonate group and bicarbonate group [According to : Chemical formula – Valency – Number of atoms].
3. Potassium sulphate and lead sulphate [According to : Chemical formula – Solubility in water].
4. Metal oxides and nonmetal oxides.

17. Once you collected an amount of rain water and another amount of sea water, and placed a litmus paper in each sample of water. You observed that its colour changed into red in case of rain water where it changed into blue in case of sea water. Explain.

18. Form the following formulae from [H, K, SO₄, OH].

1. A chemical formula for an acid.
2. A chemical formula for a base.
3. A chemical formula for a salt.

19. Mention the valency of sulphur in the following compounds, and mention their type :

1. SO₃
2. SO₂
3. Na₂S
4. H₂S

20. If you have an element (₁₉³⁹ X) :

1. Mention its kind. Why ?
2. Mention its valency (give a reason).
3. Write the chemical formula of its oxide.
4. Complete : It combines with sulphate group to give salt.

21. Two elements (X) and (Y), their atomic numbers are 11 and 17 respectively. answer the following questions :

1. Write the electronic distribution of each one.
2. What is the valency of each one? (give a reason).
3. What is the type of the compound produced due to their combination ?

22. If you have four elements (₉X, ₁₃Y, ₇Z, ₂₀Q) :

1. Write the electronic distribution of each one, then conclude the type and the valency of each element.
2. What is the type of the compound produced from :
 - a) Combination between element (X) and element (Y).
 - b) Combination between element (Y) and oxygen (₈O), write the chemical formula.
3. What is the type of the combination resulted between element (X) and element (Q) ? Write the chemical formula of the produced compound.

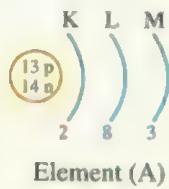
23. Element (X) combines with oxygen forming (X₂O) oxide :

1. Mention the valency of this element.
2. What is the type of the produced oxide ?

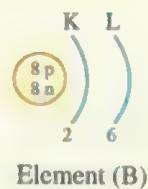


24. Study the following figures, then answer the following questions :

1 Look at the following diagrams, then answer :



Element (A)

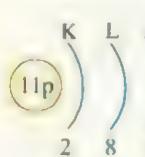


Element (B)

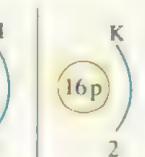
1. Mention the valency of two elements (give a reason).
2. Write the name and the chemical formula for the compound, which is produced from the combination between element (A) and element (B).

2 Choose the suitable diagram for each of the following statements :

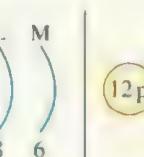
| | |
|-----------------------------------|--------------------------------------|
| 1. A divalent metallic element. | 2. A divalent nonmetallic element. |
| 3. A noble gas. | 4. A monovalent nonmetallic element. |
| 5. A monovalent metallic element. | |



(A)



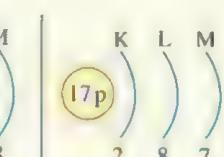
(B)



(C)



(D)



(E)

3 If you have four tubes as in the figure, answer the following questions :

1. Write the chemical formula of each one.
2. Identify the type of each of them.
3. What is the effect of putting blue litmus paper on tubes (2) and (3) ?
4. What happens by adding water to tube (1) with shaking ?
5. What is the type of chemical bond in the compound of tube (4) ?



Calcium nitrate (1)



Sodium hydroxide (2)



Sulphuric acid (3)



Silver chloride (4)

Thinking Skills Questions

1. Choose the correct answer :

1. The atom of element changes into negative ion carries one negative charge during the chemical reaction.

a. F b. Fe c. C d. Ag

2. The number of atoms equals the number of elements in the molecule of

a. sodium hydroxide. b. water. c. calcium sulphate. d. sodium nitrate.

3. The atomic group that is formed of the same elements of water is

a. carbonate. b. hydroxide. c. sulphate. d. nitrate.

4. When an element (₁₃X) combines with oxygen atom, the symbol of the produced oxide is

a. XO b. X_2O_3 c. X_2O d. X_3O_2

5. Which of the following compounds contains the largest number of atoms ?

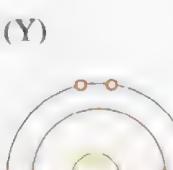
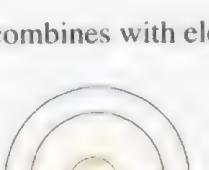
a. Sodium hydroxide. b. Sulphuric acid. c. Aluminium sulphate. d. Carbon dioxide.

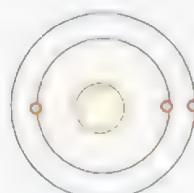
6. The number of electrons which exist in an ion of trivalent nonmetal element, the electrons of its atom revolve in 3 energy levels is

a. 8 b. 10 c. 18 d. 20

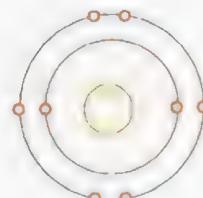
7. From the opposite two figures, when element (X) combines with element (Y) produce

a. XY b. XY_2 c. X_6Y d. X_2Y





Atom of
element (X)



Atom of
element (Y)

2. Complete the following statements :

1. The metallic element (X) that reacts with oxygen forming a compound, whose formula is (XO) and has two energy levels, so its valency is and its atomic number equals
2. If the formula of oxide of element (M) is (MO) , so the formula for its nitrate is and the formula of its phosphate is



3. A metallic element (X), its outermost energy level is M and its valency equals the number of energy levels of its ion and its mass number is doubled its atomic number. Find :

1. a. The atomic number.
b. The mass number.
c. The valency of the element.
2. Write the chemical formula for the compound molecule that is resulted from the combination of this element with oxygen.

4. A metallic element (X), whose electrons are distributed in three energy levels reacts with oxygen (₈O) forming a compound, whose formula is (XO).

Answer the following questions :

1. Find the atomic number and the valency of element (X).
2. Mention the type of the ion of element (X) and the number of charges that it carries.
3. What is the type of chemical bond in the compound (XO) ?
4. Choose :
 - (1) The ion of the element (X) combines with forming salt.

| | | | |
|------------------|-------|----------------------|-----------------|
| a. Na^+ | b. Ar | c. $(\text{NH}_4)^+$ | d. I^- |
|------------------|-------|----------------------|-----------------|
 - (2) When the ion of element (X) combines with sulphate group, a compound is formed, its formula is

| | | | |
|------------------------------|--------------------------------|-------------------|----------------------------|
| a. $\text{X}(\text{SO}_4)_3$ | b. $\text{X}_2(\text{SO}_4)_3$ | c. XSO_4 | d. X_2SO_4 |
|------------------------------|--------------------------------|-------------------|----------------------------|

5. A metallic element (X) combines with chlorine element forming a compound, whose formula is (XCl₃), if the number of energy levels in this element equals to the number of electrons in outermost energy level of its atom. Determine :

1. The atomic number and the valency of element (X).
2. The type of chemical bond in the compound (XCl₃).
3. The type of compound (XCl₃).
4. The chemical formula for hydroxide of element (X).

1. Complete the following :

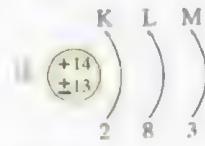
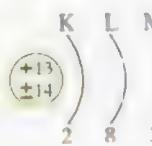
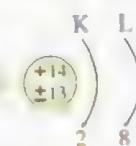
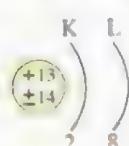
1. is the only liquid nonmetal element, while is the only liquid metal element. *(Port Said 2019)*
2. During the chemical reaction, magnesium atom ($^{24}_{12}\text{Mg}$) two electrons and changes into
3. The outermost energy level of chlorine atom ($^{35}_{17}\text{Cl}$) contains electrons, while that of chloride ion contains electrons.
4. Nonmetals are conductors of electricity except which is a good conductor of electricity.
5. Elements can be classified according to their properties and electronic structure into , and

2. Choose the correct answer :

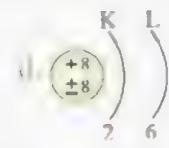
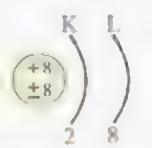
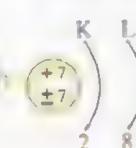
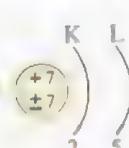
1. All of the following elements change into negative ions during chemical reactions , except

a. $^{35}_{17}\text{Cl}$ b. $^{16}_8\text{O}$ c. $^{14}_7\text{N}$ d. $^{24}_{12}\text{Mg}$

2. Which of the following figures represents the structure of aluminium ion ? (Fig.)



3. Which of the following figures represents the structure of nitrogen ion ? (Fig.)



4. During chemical reactions, oxygen atom ($^{16}_8\text{O}$) gains electrons and changes into

a. O^- b. O^+ c. O^{-2} d. O^{+2}

5. The following elements are good conductors of electricity, except

a. ${}_8\text{O}$ b. ${}_{11}\text{Na}$ c. ${}_{12}\text{Mg}$ d. ${}_{13}\text{Al}$



3. A Write the scientific term for each of the following :

1. The atom which gained an electron or more during the chemical reaction.

(El-Qahmury Formal Sch./ Aswan 2022) (.....)

2. The atom which lost an electron or more during the chemical reaction.

(Fayoum 2019) (.....)

3. Elements don't participate in chemical reactions due to the completeness of their outermost energy level.

(Hafr El-baten Sch./ Giza 2019) (.....)

B. Put (✓) or (✗), then correct what is wrong :

1. The number of energy levels in positive ion is more than that of its atom. ()

2. During the chemical reaction, sodium atom loses two electrons and changes into positive ion. ()

3. The outermost energy levels of metals contain 5 , 6 or 7 electrons. ()

4. A. Give reasons for :

1. When an atom gains an electron or more during the chemical reaction, it becomes a negative ion.

(Beni Suef 2019)

2. Both aluminium ion and nitrogen ion have the same number of electrons.

[knowing that : $^{27}_{13}\text{Al}$ & $^{14}_{7}\text{N}$].

3. Both sulphur ion and calcium ion have the same number of energy levels.

[knowing that : $^{16}_{16}\text{S}$ & $^{20}_{20}\text{Ca}$].

B. Mention the characteristics (properties) of metals.

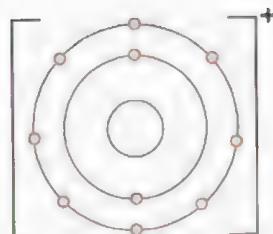
Worksheet

2

1. The opposite figure shows the electronic configuration of ion of an element.

1. Mention the type of the element and its atomic number.

.....



2. What is the number of protons in this ion ?

.....

3. What is the type of the bond formed from the combination of this ion with negative chloride ion ?

.....

2. A. What is meant by ... ?

(Port Said 2019)

1. Ionic bond :

.....

2. Covalent bond :

.....

B. Give reasons for :

1. The bond in a hydrogen molecule is a single covalent bond.

.....

.....

2. The chlorine atom (₁₇Cl) tends to combine with potassium atom (₁₉K) by an ionic bond.

.....

.....

3. Complete the following :

1. During the formation of NaCl molecule, atom loses an electron which is gained by atom.

2. The bond in sodium chloride molecule is bond, while the bond in nitrogen molecule is bond.

(Rod El-Farag Zone / Cairo 2022)

3. The ion of metallic element is charge, while the ion of nonmetallic element is charge.

Worksheet

3

1. Complete the following :

1. The valency of ferric is , while that of ferrous is
2. The chemical formula of sodium hydroxide is , while that of sulphuric acid is
3. During chemical reactions, oxygen atom can or two electrons.
4. The chemical formula of bicarbonate group is and its valency is
5. The table salt molecule is formed of combination of positive ion and negative ion.

2. A. What is meant by ... ?

(Science Inspectorate / Qena 2022)

1. Valency :
2. The chemical formula of silver chloride is AgCl :

B. Write the chemical formula of each of the following :

(El Gomrok Zone / Alex 2019)

1. Aluminium carbonate : (Cairo 2019)
2. Sodium sulphate : (New Cairo Zone / Cairo 2019)
3. Magnesium hydroxide : (El Dokki Zone / Giza 2019)
4. Ammonium carbonate : (Patriarchal College / Cairo 2019)
5. Calcium phosphate : (El Dokki Zone / Giza 2019)

3. A. Choose the correct answer :

1. All of the following are monovalent atomic groups, except
 a. nitrate. b. bicarbonate. c. phosphate. d. nitrite.
2. The chemical formula of calcium carbonate is
 a. Ca_2CO_3 b. CaCO_3 c. CaCO_2 d. CaSO_4

B. Write the scientific term for each of the following :

1. A set of atoms of different elements joined together and behave like one atom during the chemical reaction. (Ismail El-Habrouk Sch. / Behira 2019) (.....)

2. A formula that represents the number and the type of the atoms in a molecule.
(.....)

4. A Rewrite the following statements after correcting them :

1. Water molecule consists of two atoms of three different elements.

.....

2. The valency of carbon in (CO_2) molecule is divalent.

.....

3. The valency of noble gases is monovalent.

.....

B. Give reasons for :

1. Sodium is monovalent, while calcium is divalent. (El-Agamy Zone / Alex. 2019)

.....

2. Aluminium oxide molecule is composed of two aluminium atoms and three oxygen atoms.

.....

Worksheet | 4

1. A. Write the scientific term for each of the following :

1. Compounds dissociated in water producing negative hydroxide ions.

(El-Agamy Zone / Alex. 2019) (.....)

2. Compounds produced as a result of the combination of a positive metal ion (or a positive atomic group) with a negative atomic group (or a negative nonmetal ion except oxygen). (Saint Mary Sch. / Cairo 2019) (.....)

B. Give reasons for :

1. Acids turn the colour of litmus paper into red.

(El-Roula Sch. / Galyoubia 2019)

.....

2. Limewater is from bases, while lead sulphate is from salts.

.....

2. A. Complete the following :

1. Bases change the colour of litmus paper into due to the presence of ions.

2. Calcium nitrate is an example of water salts, while lead iodide is an example of water salts.



B. How can you distinguish between two unmarked tubes, one contains an acid and the other contains a base ?

.....
.....
.....

3. Choose the correct answer :

1. When an element ($_{11}X$) combines with oxygen, the symbol of the produced oxide is

a. XO b. X_2O c. XO_2 d. X_2O_3

2. All of the following are water soluble salts, except

(Shebin El-Kom Directorate / Menofia 2019)

a. sodium chloride. b. sodium sulphide.
c. silver chloride. d. potassium sulphate.

3. Sulphuric acid is characterized by all of the following, except

a. its chemical formula is (H_2SO_4) . b. it is a mineral acid.
c. it changes the colour of litmus into red. d. it has a bitter taste.

4. A. Give an example for each of the following :

1. Nonmetal oxide :

(Science Inspectorate / Giza 2022)

2. Water insoluble salt :

(El-Agamy Zone / Alex. 2019)

3. Mineral acid :

4. Metal oxide :

B. Compare between sodium hydroxide and sulphuric acid.

| Sodium hydroxide | Sulphuric acid |
|------------------|----------------|
| | |
| | |
| | |
| | |
| | |

Worksheet

5

on Lessons 1 & 2 Unit One

1. Complete the following :

1. The ion of iron II is called , while the ion of iron III is called
2. The ion of metallic element is charge, while the ion of nonmetallic element is charge.
3. The valency of metallic atoms indicates the number of electrons that are during the chemical reaction, while the valency of nonmetallic atoms indicates the number of electrons that are or
4. In ion, the number of protons in the nucleus is less than the number of that rotate around it.

2. Give reasons for :

1. Argon element can't form positive ion or negative ion in ordinary conditions.

.....
.....
.....

3. A. Identify the type of the following compounds .

1. SO_3 :
2. PbSO_4 :
3. $\text{Ca}(\text{OH})_2$:
4. HNO_3 :

(Brilliance Sch. / Alex. 2019)

B. Choose the correct answer :

1. From properties of graphite element that
- a. it is a malleable and ductile. b. it has a metallic luster.
- c. it is a good conductor of electricity. d. it is a good conductor of heat.
2. The changing of lithium atom (Li) into lithium ion (Li^+) means that it
- a. gains proton. b. gains electron. c. loses proton. d. loses electron.



3. From properties of acids that

- a. they change the colour of red litmus paper into blue.
- b. they have a bitter taste.
- c. they give H^+ ions on dissociation in water.
- d. their aqueous solutions feel slippery.

4. A. Write the chemical formula of the following compounds :

1. Sodium oxide : (*Orman Smart Sch. / Cairo 2019*)
2. Copper sulphate : (*Patriarchal College Sch. / Cairo 2019*)
3. Sodium carbonate : (*Science Inspectorate / Giza 2022*)
4. Hydrochloric acid :

B. Define :

1. The ion :

(*IT Dakkhla El-Zeina / Cairo 2019*)

2. Atomic group :

March Tests

Model 1

Total mark

10

Question 1 5 marks

A Choose the correct answer :

1. All of these elements can form negative ions, except
a. oxygen (₈O). b. nitrogen (₇N). c. chlorine (₁₇Cl). d. aluminium (₁₃Al).
2. All of these salts dissolve in water, except
a. sodium chloride. b. potassium sulphate.
c. silver chloride. d. sodium sulphide.
3. If the mass of an object is 2 kg and the Earth's gravitational acceleration is 10 m/sec²,
the object's weight equals
a. 0.2 newton. b. 2 newton. c. 20 kg. d. 20 newton.
4. Direct combination reaction takes place between
a. two nonmetals. b. a metal and a nonmetal.
c. a compound with another. d. all the previous answers.

B Give a reason for the following :

White clouds are formed when conc. hydrochloric acid reacts with ammonia gas.

.....

Question 2 5 marks

A Put (✓) or (✗) :

1. Object's weight = Its mass \times Gravitational acceleration. ()
2. The bond in water molecule is an ionic bond. ()
3. The atomic group acts as a compound in the chemical reaction. ()
4. On burning a magnesium strip in the air, a black powder is formed. ()

B What happens when ... and why ?

You push a wall with your hand.

.....


Model 2

Total mark

10

Question 1 5 marks

A Write the scientific term of each of the following :

1. An atom that has lost an electron or more during the chemical reaction. (.....)
2. A formula represents the number and the type of atoms in a molecule. (.....)
3. The amount of Earth's gravitational pull on an object. (.....)
4. Oxides that cause building corrosion. (.....)

B Give a reason for the following :

A chemical equation should be balanced.

.....

.....

Question 2 5 marks

A Put (✓) or (✗) :

1. Magnesium oxide is an ionic compound. ()
2. The valency of sulphur in sulphur trioxide (SO_3) is tetravalent. ()
3. Sulphur oxides and nitrogen oxides are acidic gases. ()
4. By increasing the ratio of (CO_2), the air temperature decreases. ()

B The weight of an object on Mars is 32 newton and on Earth is 80 newton. What's the gravitational acceleration on Mars if the gravitational acceleration on Earth is 10 m/sec^2 .

.....

.....

.....

Test

1

Answer the following questions.

A Choose the correct answer:

(8 marks)

B Give a reason for the following :

(2 marks)

A chemical equation should be balanced.

Test

2

Total mark

10

Answer the following questions.

A Choose the correct answer :

(8 marks)

1) All of these elements are metal solid elements, except

- (a) sodium.
- (b) magnesium.
- (c) mercury.
- (d) aluminium.

2) The covalent bond in an oxygen molecule is a bond.

- (a) single
- (b) double
- (c) triple
- (d) no correct answer

3) The valency of copper in (Cu_2O) is

- (a) monovalent.
- (b) divalent.
- (c) trivalent.
- (d) tetravalent.

4) The bright magnesium ribbon changes into white powder of when it burns in air.

- (a) magnesium nitrite
- (b) magnesium oxide
- (c) magnesium hydroxide
- (d) magnesium dioxide

B What happens if ... ?

(2 marks)

Approaching a wet rod with hydrochloric acid to ammonia gas.

Test

3

Answer the following questions.

A Choose the correct answer :

(8 marks)

1 Direct combination reaction takes place between

- (a) two nonmetals.
- (b) a metal and a nonmetal.
- (c) a compound with another.
- (d) all of the previous answers.

2 Sodium chloride is

- (a) an acid.
- (b) an oxide.
- (c) a base.
- (d) a salt.

3 All of these salts dissolve in water, except

- (a) sodium chloride.
- (b) potassium sulphate.
- (c) silver chloride
- (d) sodium sulphide.

4 The covalent bond usually arises between elements.

- (a) two metallic
- (b) two nonmetallic
- (c) metallic and non metallic
- (d) metallic and noble

B What is meant by :

(2 marks)

Positive ion.

Test

4

Answer the following questions.

A Choose the correct answer :

(8 marks)

1 The valency of ferrous is

- (a) monovalent.
- (b) divalent.
- (c) trivalent.
- (d) tetravalent.

2 Ammonia combines with conc. HCl producing white clouds of

- (a) ammonium chloride.
- (b) ammonium hydroxide.
- (c) sodium chloride.
- (d) aluminium hydroxide.

3 The number of atoms in ammonium nitrate molecule equals

- (a) 5
- (b) 7
- (c) 8
- (d) 9

4 The molecule of a noble gas consists of

- (a) two different atoms
- (b) one atom.
- (c) two similar atoms
- (d) one or two similar atoms

B Write the chemical formula for the following compounds :

(2 marks)

1 Sodium sulphate :

2 Copper nitrate :

Test

5

Answer the following questions.

A Choose the correct answer :

(8 marks)

1 In the compound $X(NO_3)_2$, the valency of element (X) is

(a) monovalent. (b) divalent.
(c) triavalent. (d) tetravalent.

2 The number of energy levels in sodium ion is the number of energy levels in its atom.

(a) less than (b) more than
(c) equal to (d) no correct answer

3 All of nonmetals don't conduct electricity, except

(a) bromine. (b) aluminium.
(c) graphite. (d) mercury.

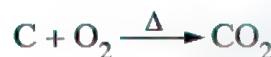
4 The chemical formula of sodium hydroxide is

(a) $NaOH$. (b) $NaCO_3$
(c) $NaHCO_3$ (d) $Na_2(CO_3)_2$

B Knowing that the mass of carbon (C) is 12 and oxygen (O) is 16 :

(2 marks)

Find the total mass of reactants and products through the following reaction :



Answers of Test

1

A 1 (c)
3 (c)

2 (d)
4 (c)

B To achieve the law of conservation of matter (mass).

Answers of Test

2

A 1 (c)
3 (a)

2 (b)
4 (b)

B White clouds of ammonium chloride are formed.



Answers of Test

3

A 1 (d)
3 (c)

2 (d)
4 (b)

B It is an atom of a metallic element that loses an electron or more during the chemical reaction.

Answers of Test

4

A 1 (b)
3 (d)

2 (a)
4 (b)

B 1 Na_2SO_4

2 $\text{Cu}(\text{NO}_3)_2$

Answers of Test

5

A 1 (b)
3 (c)

2 (a)
4 (a)

B – Mass of reactants = $12 + (2 \times 16) = 44$ gm.

– Mass of products = $12 + (2 \times 16) = 44$ gm.



February Revision

* (1) Write the scientific term :

Mr. Ahmed Elbasha

Elements have luster, good conductors of heat and electricity, (.....)

1) malleable and ductile and they contain 1, 2 or 3 electrons in their outer electron shells. (.....)

2) Compounds produced as a result of the combination of a positive ion with a negative ion except oxygen (.....)

3) The only nonmetal that exists in a liquid state. (.....)

4) The number of electrons gained, lost or even shared during a chemical reaction (.....)

5) Compounds that dissolve in water producing positive hydrogen ions H^+ (.....)

6) A bond resulting from the participation of each of the two atoms with three electrons (.....)

7) A set of atoms behaving like one atom during the reaction. (.....)

8) They are compounds resulted from the combination between oxygen and an element (.....)

9) Substances dissociate in water and give negative hydroxide ions (.....)

10) Compounds resulted from the combination between oxygen and an element even though it is a metal or a nonmetal (.....)

11) Elements have more than 4 electrons in outer level. (.....)

***(2) Choose the right answer:**

1. All the following are covalent molecules except

a. H_2O b. MgO c. N_2 d. O_2

2. The triple covalent bond is formed in molecule.

a. hydrogen b. nitrogen c. oxygen d. water

3. In positive ion, the number of protons is the number of electrons.

a. less than b. more than c. equal to

4. All of the following are metallic oxides except

a. Na_2O b. MgO c. SO_3 d. Al_2O_3

5. The chemical formula of sodium hydroxide is

a. HCl b. Na_2CO_3 c. NaOH d. NaCl

6. All of the following are covalent molecules except

a. H_2O b. N_2 c. NaCl d. O_2

7. The valency of helium (${}_2\text{He}$) is

a. zero b. one c. two d. four

8. Sodium chloride molecule is considered

a. an acid. b. an alkali. c. an oxide. d. a salt.

9. If (${}_{13}\text{Al}$) combines with (${}_{8}\text{O}$), the chemical formula of the formed compound is

a. Al_3O_2 b. AlO c. AlO_2 d. Al_2O_3

10. The type of bond in nitrogen molecule is bond.

a. double covalent b. single covalent c. triple covalent d. ionic

11. The chemical formula of carbonate group is

a. $(\text{CO}_3)^2-$ b. CO c. $(\text{HCO}_3)^-$ d. CO^2

12. The chemical formula of hydrochloric acid is

a. H_2O b. HCl c. H_2SO_4 d. HNO_3

13. The valency of argon is

a. zero. b. monovalent. c. divalent. d. trivalent.

14. The chemical formula of sulphuric acid is

a. HNO_3 b. H_2SO_4 c. HCl

15. There is a single covalent bond in molecule.

a. hydrogen b. nitrogen c. oxygen

*(3) Complete the following:

1. Acids change the color of litmus paper into , while bases change the color of litmus paper into
2. The chemical bond in hydrogen molecule (H_2) is a , while the chemical bond in nitrogen molecule (N_2) is
3. and are examples of monovalent atomic groups.
4. The bond in oxygen molecule is bond, while that in calcium oxide is bond.
5. is an example for acids, while is an example for bases.
6. Chemical formula of water is , while chemical formula of table salt is
7. is the only liquid metal, while is the only liquid nonmetal.
8. The bond in sodium chloride molecule (table salt) is Whereas in water molecule is
9. The valency of $_{13}Al$ is....., while that of $_{20}Ca$ is.....
10. During chemical reaction, sodium atom tend to..... one electron and changes into
11. The outer level in $_{17}Cl$ has electron(s), so it forms ion.

*(4) Correct the underlined words:

| | | |
|---|--|-----------|
| 1 | <u>Salts</u> are substances that dissociate in water producing negative hydroxide ions (OH^-). | (.....) |
| 2 | The chemical formula of sodium chloride is <u>AgCl</u> | (.....) |
| 3 | Nonmetals are bad conductors of electricity except <u>Sulphur</u> | (.....) |
| 4 | The bond in magnesium oxide is <u>single covalent</u> bond | (.....) |
| 5 | The bond in oxygen molecule is a <u>triple</u> covalent bond | (.....) |
| 6 | The common name of sodium <u>hydroxide</u> is table salt. | (.....) |
| 7 | <u>Oxides</u> are substances that dissociate in water producing positive hydrogen ions. | (.....) |
| 8 | (CO_2) is a <u>metal</u> oxide. | (.....) |

***(5) Give reason for:**

1. The bond in water molecule is a single covalent bond.

.....

2. Potassium (₁₉K) is monovalent, while oxygen (₈O) is divalent.

.....

3. The valency of noble gases is zero.

.....

4. Acids turn the color of litmus to red.

.....

5. Sodium is monovalent element.

.....

***(6) What happen if:**

1. Putting litmus paper in a beaker contains HCl

.....

2. An atom loses one electron or more.

.....

***(7) Put (✓) or (X) :**

1. Some elements have more than one valency such as iron (Fe). ()

2. Sodium hydroxide changes the colour of litmus paper into red. ()

3. Bromine is a liquid nonmetal. ()

4. In the positive ions, the number of electrons more than the number of protons. ()

5. All nonmetals conduct electricity. ()

6. Both mercury and bromine exist in liquid state. ()

7. All non-metals are bad conductor of electricity except graphite ()

8. All non-metals are solid except mercury ()

9. The bond in oxygen molecule is triple covalent ()

10. In ionic bond is formed due to attraction between positive and negative ions ()

11. Sodium hydroxide and lime water are bases but magnesium carbonate is salt ()

12. Chemical formula of carbonate group is (CO₃) ()

13. The valency of noble gases is zero. ()

***(8) Problems :**

1

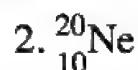
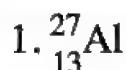
Write the electronic configuration of the atoms of the following elements ($_{18}Ar$ - $_{12}Mg$ - $_{16}S$), then indicate :

1. The type of each atom (metal - nonmetal - noble).
2. The type of each ion (positive - negative - has no ions).

.....
.....
.....

1

Write the electronic configuration and valency for the following elements :



.....
.....
.....
.....
.....

Model Answer

* (1) Write the scientific term :

| | | | |
|------------|-------------------------|-----------------|----------------|
| 1. Metals | 4. Valency | 7. Atomic group | 10. Oxides |
| 2. Salts | 5. Acids | 8. Oxides | 11. Non-metals |
| 3. Bromine | 6. Triple covalent bond | 9. Bases | |

* (2) Choose the right answer:

| | | | | |
|------|------|------|-------|-------|
| 1. B | 4. C | 7. A | 10. C | 13. A |
| 2. B | 5. C | 8. D | 11. A | 14. B |
| 3. B | 6. C | 9. D | 12. B | 15. A |

* (3) Complete the following :

| | | |
|--------------------------------------|---|---------------------------------|
| 1. Red – blue | 4. Covalent – ionic | 8. Ionic – single covalent bond |
| 2. Single covalent – triple covalent | 5. Hydrochloric acid – sodium hydroxide | 9. Trivalent – divalent |
| 3. Hydroxide – bicarbonate | 6. H_2O – NaCl | 10. Lose – positive ion |
| | 7. Mercury bromine | 11. 7 negative |

* (4) Correct the underlined words:

| | | | |
|------------------|---------------|-------------|--------------|
| 1. Base | 3. Graphite | 5. Double | 7. Acids |
| 2. NaCl | 4. Ionic bond | 6. Chloride | 8. Non-metal |

* (5) Give reason for:

1. Because oxygen atom shares with two electrons, while each hydrogen atom shares with one electron only.
2. Because during chemical reactions, potassium atom loses one electron, while oxygen gains or shares with two electrons to complete their outermost shell.
3. Because their outermost energy levels are completely filled with electrons so they don't lose, gain or share with any electrons.
4. Because acids when dissolved in water produce positive hydrogen ions H^+
5. Because during chemical reactions, it loses one electron

* (6) What happen if:

1. It will change into red
2. It will change to positive ion

* (7) Put (✓) or (X) :

| | | | | |
|----------|----------|----------|-----------|-----------|
| 1. (✓) | 4. (X) | 7. (✓) | 10. (✓) | 13. (✓) |
| 2. (X) | 5. (X) | 8. (X) | 11. (✓) | |
| 3. (✓) | 6. (✓) | 9. (X) | 12. (✓) | |

* (8) Problems

| | |
|--|---|
| <p>1</p> <p>1. Noble gas 2. has no ions</p> <p>Ar $\begin{array}{c} \text{K} \quad \text{L} \quad \text{M} \\ \left(\begin{array}{c} 2 \\ 8 \\ 8 \end{array} \right) \end{array}$</p> <p>1. Metal element 2. Positive ion</p> <p>Mg $\begin{array}{c} \text{K} \quad \text{L} \quad \text{M} \\ \left(\begin{array}{c} 2 \\ 8 \\ 2 \end{array} \right) \end{array}$</p> <p>1. Nonmetal element 2. Negative ion</p> <p>S $\begin{array}{c} \text{K} \quad \text{L} \quad \text{M} \\ \left(\begin{array}{c} 2 \\ 8 \\ 6 \end{array} \right) \end{array}$</p> | <p>2</p> <p>1. Al 2. Ne 3. Mg</p> <p>$\begin{array}{c} \text{K} \quad \text{L} \quad \text{M} \\ \left(\begin{array}{c} 2 \\ 8 \\ 3 \end{array} \right) \end{array}$ $\begin{array}{c} \text{K} \quad \text{L} \\ \left(\begin{array}{c} 2 \\ 8 \end{array} \right) \end{array}$ $\begin{array}{c} \text{K} \quad \text{L} \quad \text{M} \\ \left(\begin{array}{c} 2 \\ 8 \\ 2 \end{array} \right) \end{array}$</p> <p>- Trivalent.</p> <p>- Zero.</p> <p>- Divalent.</p> |
|--|---|

Unit 1

Chemical Combination

| metals | Non-metals |
|---|---|
| They are elements which have less than (4) electrons in the outermost energy level. | They are elements which have more than (4) electrons in the outermost energy level. |
| Solids - except (Mercury "Hg" is liquid). | Solids – gases – except (Bromine "Br" is liquid). |
| They have metallic luster | They have no luster |
| They are malleable and ductile | They are not malleable or ductile |
| They are good conductors of heat and electricity | They are bad conductors of heat and electricity – Except (Graphite "Carbon" is good conductor of electricity) |

Types of ions

| Positive ion | negative ion |
|---|--|
| It is an atom of metallic element that loses an electron or more during chemical reaction. | It is an atom of nonmetallic element that gains an electron or more during chemical reaction. |
| It carries positive charges equal to the number of the lost electrons. | It carries negative charges equal to the number of the gained electrons. |
| The number of its electrons is less than the number of protons inside the nucleus. | The number of its electrons is more than the number of protons inside the nucleus. |
| The number of energy levels is less than that of its atom. | The number of energy levels is equal to that of its atom. |

Types of bonds:

| Ionic bond | Covalent bond |
|---|---|
| It is a bond resulting from the electric attraction between a positive ion and a negative ion. | It is a bond occurred among the atoms of non-metals through the participation of each atom with the same number of electrons to complete the outer electron shell of each atom |

Types of covalent bond:

1-Single covalent bond: It is the bond which arises between two nonmetal atoms, where each atom shares the other atom with one electron.

2-Double covalent bond: It is the bond which arises between two nonmetal atoms, where each atom shares the other atom with two electrons.

3-Triple covalent bond: It is the bond which arises between two nonmetal atoms, where each atom shares the other atom with three electrons.

| Ionic bond | Covalent bond |
|--|--|
| - Formed due to: Electrical attraction between two different elements one is metal "positive ion" and another one is nonmetal "negative ion") to form compound. | -Formed due to: sharing of one pair of electrons or more between: two similar nonmetal atoms to form molecule. two different nonmetal atoms to form compound. |

Lesson (2) Chemical Combination

Valency: It is the number of electrons that atom loses, gains or shares during a chemical reaction.

Valency of Metals

| Monovalent | Divalent | Trivalent |
|-----------------|------------------|-----------------|
| - Lithium (Li) | - Mercury (Hg) | - Aluminum (Al) |
| - Sodium (Na) | - Magnesium (Mg) | - Gold (Au) |
| - Potassium (K) | - Calcium (Ca) | |
| - Silver (Ag) | - Lead (Pb) | |

- Copper (Cu): Monovalent - Divalent
- Iron (Fe): - Divalent (Ferrous) - Trivalent (Ferric)

Valency of Nonmetals

| Monovalent | Divalent | Trivalent | Tetraivalent |
|----------------|-----------------|--------------|------------------|
| - Hydrogen (H) | - Chlorine (Cl) | - Oxygen (O) | - Nitrogen (N) |
| - Bromine (Br) | - Iodine (I) | | - Phosphorus (P) |
| - Fluorine (F) | | | - Carbon (C) |

- Sulphur (S): Divalent – Tetraivalent – Hexavalent
- Nitrogen (N) – Phosphorus (P): Trivalent

Atomic groups: set of atoms (of different elements) joined together behave like (1) atom during chemical reaction.

| Monovalent | Divalent | Trivalent |
|-----------------------------------|--------------------------------|--------------------------------|
| - Hydroxide (OH) | - Carbonate (CO ₃) | - Phosphate (PO ₄) |
| - Nitrate (NO ₃) | - Sulphate (SO ₄) | |
| - Nitrite (NO ₂) | | |
| - Ammonium (NH ₄) | | |
| - Bicarbonate (HCO ₃) | | |

Chemical formula: It is a formula that represents the number and types of the atoms in a molecule.

| Compound | Chemical formula | Compound | Chemical formula | Compound | Chemical formula |
|-----------------|------------------|--------------------|---|---------------------|---------------------|
| Sodium Chloride | NaCl | Aluminium Sulphate | Al ₂ (SO ₄) ₃ | Magnesium Hydroxide | Mg(OH) ₂ |



| | | | | | |
|------------------|---------------------------------|---------------------|---|--------------------|-------------------|
| Sodium Nitrate | NaNO ₃ | Aluminium Carbonate | Al ₂ (CO ₃) ₃ | Magnesium Sulphate | MgSO ₄ |
| Sodium sulphate | Na ₂ SO ₄ | Aluminum Oxide | Al ₂ O ₃ | Hydrogen Chloride | HCl |
| Sodium Hydroxide | NaOH | Water | H ₂ O | Calcium Carbonate | CaCO ₃ |
| Sodium Carbonate | Na ₂ CO ₃ | Copper Carbonate | CuCO ₃ | Calcium Sulphate | CaSO ₄ |
| Sodium Oxide | Na ₂ O | Carbon Dioxide | CO ₂ | Calcium Oxide | CaO |

Compare between acids and bases

| Acids | Bases |
|---|--|
| They are substances which dissolve in water producing positive hydrogen ions (H) ⁺ . | They are substances which dissolve in water producing negative hydroxide ions (OH) ⁻ . |
| The symbol of acids begins with H. | The symbol of alkalis ends with OH. |
| They have sour taste. | They have bitter taste. |
| They change color of litmus paper into red: Due to presence of hydrogen ions (H) ⁺ . | They change color of litmus paper into blue: Due to presence of hydroxide ions (OH) ⁻ . |
| Ex: Hydrochloric acid (HCl) – Sulphuric acid (H ₂ SO ₄) | Ex: Sodium Hydroxide (NaOH) - |

Types of Compounds:

Oxides: They are compounds resulted from combination between oxygen and element which is metal or non-metal.

| Metal oxides | Non-metal oxide |
|--|--|
| Formed from combination of oxygen with metal. | Formed from combination of oxygen with nonmetal. |
| Sodium oxide (Na_2O) - Calcium Oxide (CaO) – (Al_2O_3). | Carbon dioxide (CO_2) – Sulphur trioxide (SO_3). |

Salts:

Compounds resulted from combination of positive ion (or atomic group) with negative atomic group (or ion except (O_2)).

Mineral salts:

| Salts dissolved (soluble) in water | | Salts undissolved (insoluble) in water | |
|--|--|--|---------------------|
| Sodium chloride (NaCl) | Sodium sulphide (Na_2S) | Silver chloride | (AgCl) |
| Potassium sulphate (K_2SO_4) | Calcium nitrate [$\text{Ca}(\text{NO}_3)_2$] | Lead iodide | (PbI_2) |
| Magnesium carbonate (MgCO_3) | | Lead sulphate | (PbSO_4) |

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1) Complete:

- 1- The bond in sodium chloride molecule (table salt) is Whereas in water molecule is
- 2- On dissolving acid in water, it gives Positive ions, while alkali gives negative ions
- 3- Elements classified into, and
- 4- The valency of ^{13}Al is....., while that of ^{20}Ca is.....
- 5- During chemical reaction, sodium atom tend to..... one electron and changes into
- 6- The bond in nitrogen molecule is while that of magnesium oxide is.....
- 7- The bond in oxygen molecule is while that of calcium oxide is
- 8- Acids change the color of litmus paper into due to the presence of
- 9- The outer level in ^{17}Cl has electron(s), so it form ion. Its bond is bond
- 10- is one of acids has oxygen, while is one acids hasn't oxygen.
- 11- The valency of sulphate group is while that of hydroxide group is
- 12- is a liquid metal, but is a liquid non-metal.
- 13- Nitrogen atom has electrons, while nitrogen ion has electrons
- 14- Acids have taste, while base has taste
- 15- The valency of ^{20}Ca is, while that of ^{17}Cl is and that of noble gas ^{18}Ar is.....

2) Put (✓) or (✗) and correct the wrong ones:

- 1- All non-metals are bad conductor of electricity except graphite ()
- 2- Lithium ion has one positive charge ()

3- All non-metals are solid except mercury ()

4- The bond in oxygen molecule is triple covalent ()

5- In ionic bond is formed due to attraction between positive and negative ions

6- Water molecule consists of 2 atoms of two elements ()

7- The chemical formula of nitric acid is HNO_3 ()

3) Choose the correct answer:

1- The number of known elements till now is
a. 118 b. 113 c. 92 d. 20

2- From solid metal
a) Mercury b. nitrogen c. magnesium d. chlorine

3- The neutral atom and change to positive ion.
a. Gain electrons b. Charge of nucleus change
c. number of energy levels increases. d. lose electrons

4- In positive ion – the number of protons number of electrons.
a. less than b. more than c. equal

5- The type of bond in water molecule
a. covalent b. single covalent c. double covalent

6- The triple covalent bond is formed in molecule
a. Hydrogen b. Nitrogen c. Oxygen d. water

7- Argon isvalent.
a. zero b. mono c. di d. Tri

8- The chemical formula of carbonate is
a. Co_3 b. Co c. HCo_3 d. SO_4

9- salt dissolve in water.
a. K_2SO_4 b. Cu CO₃ c) Pb SO_4

10-is the bond in hydrogen molecule
a. covalent b. single covalent c. double covalent

4) Write scientific term:

- 1- The number of electrons gained, lost or even shared during a chemical reaction. ()
- 2- Elements have more than 4 electrons in outer level. ()
- 3- An atom loses or gains electrons during chemical reaction ()
- 4- It is the atom which loses an electron or more during chemical reaction. ()
- 5- An atom that doesn't give or gain any electrons during chemical reaction. ()
- 6- The only non-metal that exists in a liquid state. ()
- 7- An atom that give an electron or more during chemical reaction. ()
- 8- Elements which the outermost shells are completely filled with electrons. ()
- 9- The bond resulting from the electric attraction between positive ion (metal) and negative ion (non- metal). ()
- 10- A bond resulting from participation (sharing) of each of two atoms with three electrons. ()
- 11- The bond that is formed between Magnesium and oxygen. ()
- 12- A set of atoms joined together behave like one atom during chemical reaction and have own valency. ()
- 13- Compounds dissolved in water producing positive hydrogen atom. ()
- 14- Substance that dissolve in water to produce negative hydroxide ion. ()

15- Compounds resulted from the combination between oxygen and element. ()

16- Compounds produced as a result of the combination of a positive ion with negative ion except oxygen. ()

5) Write the chemical formula of the following:

| The Compound | Chemical formula | The Compound | Chemical formula |
|---|------------------|------------------------|------------------|
| 1. Sodium Chloride | | 13. Sodium Oxide | |
| 2. Sodium nitrate | | 14. Carbon Dioxide | |
| 3. Sodium Carbonate | | 15. Hydrogen Chloride. | |
| 4. Sodium Hydroxide (Caustic soda) | | 16- Sulphur trioxide | |
| 5. Calcium Chloride | | 17- Sulphuric acid | |
| 6. Calcium Nitrate | | 18- Nitric acid | |
| 7. Calcium Carbonate | | 19- Hydrochloric acid | |
| 8. Calcium Sulphate | | 20-Sulphur dioxide | |
| 9. Calcium Hydroxide | | 21- Ferrous oxide | |
| 10. Copper Carbonate | | 22- Ferric hydroxide | |
| 11. Aluminum Carbonate | | 23- Water | |
| 12. Aluminum Sulphate | | 24- Ammonium nitrate | |

6) Give reason for:

1-When an atom gives an electron or more, it becomes a positive ion.

.....

2-When an atom gains an electron or more, it becomes a negative ion.

.....

3-The bond in a molecules of magnesium oxide (MgO) is an ionic bond.

.....

4-Ionic bond produce compounds only not elements, but covalent bonds produce both element and compound.

.....

5- When an atom of chlorine (${}_{17}\text{Cl}$) is joined with an atom of sodium (${}_{11}\text{Na}$) the product will be ionic bond.

.....

6- When two atoms of chlorine are joined together; the product will be covalent bond.

.....

7- The bond in Oxygen molecules is a double covalent bond.

.....

8-The bond in water molecule is a single covalent bond.

.....

9- Potassium (${}_{19}\text{K}$) is monovalent, while oxygen (${}_{8}\text{O}$) is divalent.

.....

Model answer

| | | |
|--|----------------------------------|-------------------------------------|
| 1- Single covalent | 2- H – OH | 3- Metals – nonmetals – inert gases |
| 4- tri – di | 5- lose – positive ion | 6- triple covalent – ionic |
| 7- double - ionic | 8- red – H^+ | |
| 9- (7) – negative ion – single covalent | | |
| 10- H_2SO_4 - HCl | | |
| 11- divalent - mono valent | 12- mercury – bromine | |
| 13- 7 – 10 | | |
| 14- sour – bitter | 15- divalent – monovalent – zero | |

2}

1- ✓ 2- ✓ 3- x 4- x 5- ✓ 6- x 7- ✓

3}

1- a 2- c 3- d 4- b 5- b

6- b 7- a 8- a 9- a 10- b

4} 1- valency 2- non metals 3- ion 4- positive ion 5- inert gas

6- bromine 7- non metal 8- inert gases 9- ionic bond

10- covalent bond 11- ionic bond 12- atomic group 13- acids

14- bases 15- oxides 16- salts

| The Compound | Chemical formula | The Compound | Chemical formula |
|---|---|------------------------|---------------------------------|
| 1. Sodium Chloride | NaCl | 13. Sodium Oxide | Na ₂ O |
| 2. Sodium nitrate | NaNO ₃ | 14. Carbon Dioxide | CO ₂ |
| 3. Sodium Carbonate | Na ₂ CO ₃ | 15. Hydrogen Chloride. | HCl |
| 4. Sodium Hydroxide (Caustic soda) | NaOH | 16- Sulphur trioxide | SO ₃ |
| 5. Calcium Chloride | CaCl ₂ | 17- Sulphuric acid | H ₂ SO ₄ |
| 6. Calcium Nitrate | Ca(NO ₃) ₂ | 18- Nitric acid | HNO ₃ |
| 7. Calcium Carbonate | CaCO ₃ | 19- Hydrochloric acid | HCl |
| 8. Calcium Sulphate | CaSO ₄ | 20- Sulphur dioxide | SO ₂ |
| 9. Calcium Hydroxide | Ca(OH) ₂ | 21- Ferrous oxide | FeO |
| 10. Copper Carbonate | CuCO ₃ | 22- Ferric hydroxide | Fe ₂ O ₃ |
| 11. Aluminum Carbonate | Al ₂ (CO ₃) ₃ | 23- Water | H ₂ O |
| 12. Aluminum Sulphate | Al ₂ (SO ₄) ₃ | 24- Ammonium nitrate | NH ₄ NO ₃ |

6}

1- Bec. The number of positive protons is more than the number of negative electrons

2- Bec. The number of positive protons is less than the number of negative electrons.

3-Bec. Magnesium is metal lose 2 electrons and change into positive ion while oxygen is non metal gain 2 electrons and change into negative ion .

4-bec. Ionic bond occurs between two different elements one metal and the other one non metal - while covalent bond occurs between two nonmetals

5- Bec. sodium is metal lose 1 electron and change into positive ion while chlorine is non metal gain 1 electron and change into negative ion

6- Bec. Both of atoms are nonmetals each one share with one electron

7- Bec. Each oxygen atom share with two electrons

8- Bec. Each oxygen atom share with one electron

9- Bec. Potassium atom tend to lose one electron in the outer most energy level

While oxygen tend to gain two electrons in the outer most energy level

First : Metals and Nonmetals

1 – Compare between each of the following :

1 – Metals and nonmetals

| P.O.C | Metals | Nonmetals |
|---|--------|-----------|
| Definition | | |
| Physical state | | |
| Luster | | |
| Malleability and ductility | | |
| Electric and heat conductivity | | |
| Number of electrons in the outermost energy level | | |
| Behaviour of their atoms during the chemical reactions | | |
| Examples | | |

2 – Write the scientific term for each of the following :

- 1 – Elements have luster, **good** conductors of **heat** and **electricity**, malleable and ductile and they have 1, 2 or 3 electrons in their outer electron shells
- 2 – The **only metal** that exists in a **liquid state**
- 3 – They are solids and gases, not lusters, **bad** conductor of **heat** and **electricity**, brittle and containing 5, 6 or 7 electrons in their outer shell
- 4 – The **only nonmetal** that exists in a **liquid state**

5 - The only nonmetal that conducts electricity

6 - A non-metallic element although it contains one electron in its outer shell

3 - Complete the following statements :

1 - The number of known elements up till now is.....elements

2 - Elements are classified according to their.....and.....into.....and.....

3 - Metals have less than.....electrons in the outermost shell

4 - All metals are.....except.....which is a liquid

5 - Metals may be solids as.....and liquids as.....

6 -elements are good conductors of heat and electricity

7 - Nonmetals have.....than 4 electrons in their outermost shell

8 - Nonmetals are solids and.....except.....which is a liquid

9 - Nonmetals may be solids as....., liquids as.....and gases as.....

10 - All nonmetals are.....conductors of electricity, except.....which is.....conductor of electricity

4 - Give reason for each of the following :

1 - The electric wires are manufactured from copper?

.....

2 - Some metals are used in manufacturing of some cooking pots?

.....

3 - Jewellery is made up of some metallic elements?

.....

5 - What happens when :

1 - You hammer on a piece of carbon? Why?

.....

6 - Put (✓) or (✗), then correct the false statement :

1 – All metals are solids **except** mercury which is a liquid (.....)

2 – **Bromine** is the only liquid metal (.....)

3 – **Nonmetals** exist in **three** states (.....)

4 – **Bromine** is the **only** liquid nonmetal (.....)

5 – **Graphite** is a **metal** which is a **good** conductor of **electricity** (.....)

6 – **Active gases** are **gaseous nonmetals** (.....)

7 – **Hydrogen** gas is a **gaseous nonmetal** (.....)

8 – **Hydrogen** (${}_1\text{H}$) is a **metal** as it has **one** electron in **outermost** energy level (.....)

9 – **Carbon** is a **solid metal** (.....)

7 - Choose the correct answer :

5 – All the following are **metals**, *except*.....

- a. iron
- b. oxygen
- c. sodium
- d. copper

6 – The only **metal** that exists in a **liquid state** is.....

- a. bromine
- b. mercury
- c. oxygen
- d. water

7 – What is the **liquid element** that has a **metallic luster**?.....

- a. Mercury
- b. Bromine
- c. Iodine
- d. Chlorine

8 – The **cables of electric wires** are made up of an element, its **atomic number** is.....

- a. 10
- b. 7
- c. 13
- d. 17

9 – The element which has **atomic number 12** is considered from.....

- a. metals
- b. nonmetals
- c. noble gases
- d. acids

10 – All of the following are from the **properties of nonmetals**, *except*.....

- a. they aren't malleable and ductile
- b. they aren't good conductors of electricity
- c. they contains 1, 2 or 3 electrons in outermost shell
- d. they are bad conductor of heat

11 – **Hydrogen, oxygen and carbon** are from.....

- a. acids
- b. bases
- c. metal
- d. nonmetals

12 – The only **nonmetal** that exists in a **liquid state** is.....

- a. bromine
- b. mercury
- c. oxygen
- d. water

13 – All of nonmetals **don't** conduct electricity, *except*.....

- a. bromine
- b. aluminium
- c. graphite
- d. mercury

14 – All the following materials are **good** conductors of **electricity**, *except*.....

- a. copper
- b. aluminium
- c. carbon
- d. sulphur

8 – Choose the odd word out – write the scientific term :

1 – Magnesium – Sodium – Mercury – Aluminum (.....)

The scientific term for others :.....

2 – Bromine – Carbon – Sulphur – Phosphorus (.....)

The scientific term for others :.....

3 – Hydrogen – Oxygen – Nitrogen – Graphite (.....)

The scientific term for others :.....

4 – Silver – Potassium – Oxygen - Calcium (.....)

The scientific term for others :.....

5 – ₁₇Cl – ₂₀Ca – ₁₉K – ₁₁Na (.....)

The scientific term for others :.....

6 – ₉F – ₁₆S – ₅B – ₁₅P (.....)

The scientific term for others :.....

7 – ₁₂Mg – ₁₁Na – ₄Be – ₂₀Ca (.....)

The scientific term for others :.....

9 – Mention one difference between :

1 – Graphite and oxygen

| Graphite | Oxygen |
|----------|--------|
| | |
| | |

2 – O₂ and 2O

| O ₂ | 2O |
|----------------|-------|
| | |
| | |

3 – Mercury and Bromine

| Graphite | Oxygen |
|----------|--------|
| | |

Second : Positive ion and Negative ion

1 – Compare between each of the following :

1 – Positive ion and negative ion

| P.O.C | Positive ion (Cation) | Negative ion (Anion) |
|---------------------------------|-------------------------|-------------------------|
| Definition | | |
| Charge | | |
| Number of electrons and protons | | |
| Number of energy levels | | |
| Examples | | |

2 – Write the scientific term for each of the following :

1 – An atom that loses (gives) an electron or more during the chemical reaction

2 – An atom that gained an electron or more during the chemical reaction

3 – Complete the following statements :

1 – Atoms of.....tend to lose an electron or more during the chemical reaction and change into.....ions

2 – An atom that lost an electron or more during the chemical reaction is called.....

3 – The positive ion carries a number of.....charges that are equal to the number of.....electrons

4 – During the chemical reaction, sodium atom ($^{23}_{11}Na$) loses (gives).....electron and changes into.....ion

5 – The number of electrons in the outermost shell of magnesium ($^{24}_{12}Mg$) atom is....., while that of magnesium **ion** is.....

6 – Sodium **atom** ($^{23}_{11}Na$) contains.....electrons, while sodium **ion** contains.....electrons

7 – The symbol of sodium **atom** is....., while that of sodium **ion** is.....

8 – Atoms of.....tend to gain an electron or more during the chemical reaction and change into.....ions

9 – An atom that gained an electron or more during the chemical reaction is called.....

10 – The negative ion carries a number of.....charges that are equal to the number of.....electrons

11 – During the chemical reaction, nitrogen **atom** ($^{14}_{7}N$) gains.....electrons and changes into.....ion

12 – The number of electrons in the outermost shell of oxygen ($^{16}_{8}O$) atom is....., while that of oxygen **ion** is.....

13 – Nitrogen **atom** ($^{14}_{7}N$) contains.....electrons, while nitrogen **ion** contains.....electrons

14 – The symbol of oxygen **atom** is....., while that of oxygen **ion** is.....

15 – The number of energy levels in an atom of.....element is equal to the number of energy levels in its ion, while the number of energy levels in an atom of.....element is more than the number of energy levels in its ion

4 - What happens when :

1 – An atom **loses** one electron or more?.....

2 – An atom **gains** one electron or more?.....

5 - Give reason for each of the following :

1 – When an atom **loses** (gives) an electron or more, it becomes a **positive ion**?.....

2 – Both sodium **ion** and magnesium **ion** have the same number of **electrons**?.....

3 – It is **impossible** to combine sodium and magnesium to form a **compound**?.....

4 – When an atom **gains** an electron or more, it becomes a **negative ion**?.....

5 – Both nitrogen **ion** and oxygen **ion** have the same number of **electrons**?.....

6 - Choose the correct answer :

1 – When an atom of an element **loses** one electron or more during, it changes into....

- a. a positive ion
- b. a negative ion
- c. a neutral atom
- d. (a) and (b)

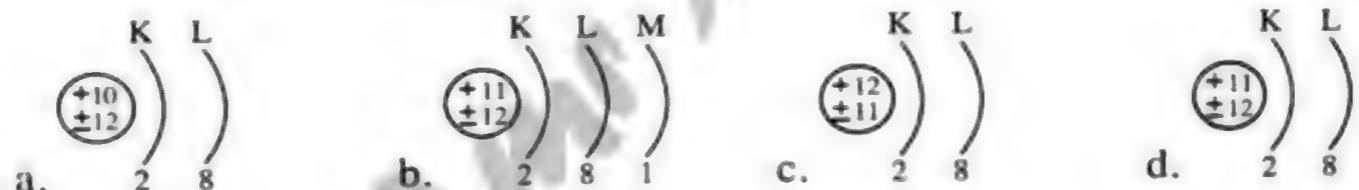
2 – All the following elements **can** form a **positive ion**, **except**.....

- a. $_{11}\text{Na}$
- b. $_{17}\text{Cl}$
- c. $_{12}\text{Mg}^{+}$
- d. $_{19}\text{K}$

3 – In a **positive ion**, the **number of protons** in.....the **number of electrons**

- a. more than
- b. less than
- c. equal to
- d. double

4 – Which of the following is the electronic structure of sodium **ion**? Fig. (.....)



5 – Number of **energy levels** in sodium **ion** is.....number of **energy level** of its **atom**

- a. more than
- b. less than
- c. equal to
- d. half

6 – A lithium **atom** (Li) changes into a lithium **ion** (Li⁺), which mean that it.....

- a. gains one proton
- b. loses one proton
- c. gains one electron
- d. loses one electron

7 – During the chemical reaction, a **magnesium atom** ($_{12}\text{Mg}$) loses its **outer electrons** and changes into.....

- a. Mg⁺
- b. Mg⁻
- c. Mg⁺²
- d. Mg⁻²

8 – An element (X), its atomic number is 12, so the number of electrons in its ion is.....

9 - The **difference** between sodium **atom** ($_{11}\text{Na}$) and sodium **ion** (Na^+) is the number of

10 - The **number of electrons** in the **ion** of sodium (Na^+) is.....

11 – The number of electrons in the **outer level (shell)** of $_{13}Al^{+3}$ is.....

12 - Each of the following sentences is **true** about aluminium element ($_{13}\text{Al}$), **except**....

- a. its nucleus contains 13 positive protons
- b. number of neutrons in its nucleus is greater than the number of protons
- c. number of energy level in its ion is equal to that of its atom
- d. number of electrons in its ion is less than number of protons in its atom

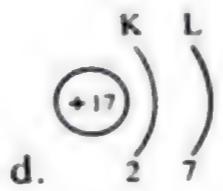
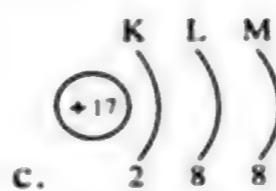
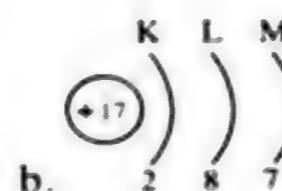
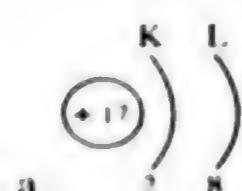
13 - When an atom of an element **gains** one electron or more during, it changes into.....

14 – All the following elements **can** form a negative ion, **except**.....

a. ${}_7\text{N}$ b. ${}_8\text{O}$ c. ${}_{16}\text{S}$ d. ${}_{20}\text{Ca}$

15 – In a negative ion, the number of electrons is.....the number of protons

16 - Which of the following is the electronic structure of chloride **ion**? Fig. (.....)



17 – Number of **energy levels** in chloride **ion** is.....number of **energy level** of its **atom**

- a. more than
- b. less than
- c. equal to
- d. double

18 – An oxygen atom (**O**) changes into an oxygen ion (**O⁻²**), which mean that it.....

- a. gains 2 protons
- b. loses 1 proton
- c. gains 2 electrons
- d. loses 3 electrons

19 – During the chemical reaction, oxygen atom (₈O) **gains** 2 electrons and changes to....

- a. O⁺
- b. O⁻
- c. O⁺²
- d. O⁻²

20 – When a nitrogen atom (₇¹⁴N) gains electrons to complete its outer shell, it becomes..

- a. N⁺³
- b. N⁻²
- c. N⁻³
- d. N⁻

21 – The **number of electrons** in the **ion** of **oxygen** (O⁻²) is.....

- a. 1
- b. 8
- c. 2
- d. 10

22 – The **number of electrons** in the **outer level (shell)** of ₇N⁻³ is.....

- a. 8
- b. 13
- c. 10
- d. 3

23 – An **element** (Y), its **atomic number** is 17, so electronic configuration of its **ion** is...

- a. 2,8,7
- b. 2,8,8
- c. 2,8,8,7
- d. 2,8,1

24 – The **difference** between chlorine **atom** (₁₇Cl) and chloride **ion** (Cl⁻) is number of...

- a. electrons
- b. protons
- c. energy levels
- d. (a) and (c)

25 – Which of the following is **negatively charged** and its **outermost energy level** is **completely filled with electrons**?.....

- a. Neon atom
- b. Ammonium group
- c. Sulphide ion
- d. Chlorine atom

7 - Put (✓) or (✗), then correct the false statement :

1 – Sodium, magnesium and aluminium can form **positive ions** (.....)

2 – In **positive** ion, the **number of electrons** is **greater than** that of **protons** (.....)

3 – The **number of energy levels** in the **positive** ion is **more than** that of its **atom** (.....)

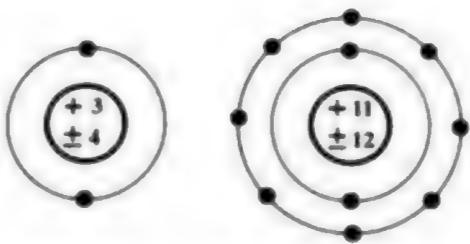
4 – **Oxygen, nitrogen and chlorine** can form **negative ions** (.....)

5 – In **negative** ions, the **number of protons** is **less than** that of **electrons** (.....)

6 – The **number of energy levels** in the **negative** ion is **equal to** that of its **atom** (.....)

8 – Study the following figures, then answer :

4 - From the two opposite figures : The **charge** of the two ions is.....



2 – The following figures represent the **electronic configuration** for the **outermost energy level** of four **atoms of elements**, its electrons revolve in **three energy levels**



a. What are the **elements** that are considered from **metals**?
.....

b. What is the **element** which forms **an ion** from the type M^+ ?
.....

c. What is the **type** of the **ion** which the **element** (R) **forms**? (Give reason)
.....

d. What is the **element**, whose **nucleus** contains **11 protons**? (Give reason)

Third : Nobel (inert) gases

1 – Write the definition each of the following :

1 - Nobel (inert) gases :.....
.....

2 – Write the scientific term for each of the following :

- 1 – Elements whose outermost shells are completely filled with electrons
- 2 – An atom of an element that *doesn't* lose or gain any electrons
- 3 – The only inert gas that has 2 electrons in its outermost energy level

3 – Complete the following statements :

- 1 – An atom of.....*doesn't* lose or gain any electrons under ordinary conditions
- 2 –and.....are examples of inert gases
- 3 – All of noble gases contain.....electrons in their outermost energy level, except.....which has.....electrons in its energy level.....

4 – Give reason for each of the following :

- 1 - Nobel gases (as argon) can't form either positive or negative ions?.....
.....

5 – Choose the correct answer :

- 1 – All the following are from properties of inert gases, *except*.....
 - a. they don't participate in chemical reactions
 - b. their outermost shells are completely filled with electrons
 - c. they form negative ions
 - d. their molecules consist of one single atom

2 - All of these elements **can** participate in chemical reactions, **except**.....

a. $_{11}\text{Na}$

b. $_{10}\text{Ne}$

c. $_{1}\text{H}$

d. $_{7}\text{N}$

3 - The molecules of inert gases consist of.....

a. two different atoms

b. one atom

c. two similar atoms

d. one or two similar atoms

6 - Put (✓) or (✗), then correct the false statement :

1 - Nobel gases **can't** form either **positive** or **negative** ions (.....)

2 - Nobel gases **lose electrons** and change into **positive ions** (.....)

3 - The molecules of nobel gases are **diatomic** (consist of two atoms) (.....)

Fourth : The atom and The ion

1 - Compare between each of the following :

1 - The atom and the ion

| P.O.C | The atom | The ion |
|--|----------|---------|
| Electric charge | | |
| Number of electrons | | |
| Number of electrons in the outermost energy level | | |

2 - Write the definition each of the following :

1 - The ion :.....
.....

3 – Write the scientific term for each of the following :

1 – An atom that **loses** (gives) or gains an electron or more during chemical reaction

4 – Complete the following statements :

1 – The **atom** is.....in its ordinary state, while the **ion** may be.....or.....charged

5 - Give reason for each of the following :

1 – The number of **electrons** of an **ion** differs from that of its **atom**?

2 – Sodium atom (₁₁Na) tends to form a **positive ion**, while oxygen atom (₈O) tends to form a **negative ion**?

3 – Both sodium **ion** and oxygen **ion** have the same number of **electrons**?

4 – Both sulphur and calcium **ions** have same number of **energy levels**? (₁₆S - ₂₀Ca)?

6 - Choose the correct answer :

1 – When an **atom** is changed into an **ion**, the.....is **changed**

- a. number of protons
- b. number of electrons
- c. number of neutrons
- d. mass number

2 – The number of **electrons** in the **outermost energy level** of oxygen **ion** equals the number of **electrons** in the **outermost energy level** of.....

- a. ₂₀⁴⁰Ca **ion**
- b. ₇¹⁴N **atom**
- c. ₁₇³⁵Cl **atom**
- d. ₁₆³²S **atom**

3 - The electronic configuration of potassium ($_{19}K$) ion is similar to the electronic configuration of.....ion

a. $_{8}O$ b. $_{11}Na$ c. $_{18}Ar$ d. $_{17}Cl$

4 - A nonmetal, its nucleus contains 18 neutrons, its electrons orbit in 3 energy levels and it tends to gain 1 electron during the chemical reactions, its **mass no.** is....

a. 17 b. 18 c. 35 d. 40

5 - There is an equal number of electrons in the ions of.....

a. chloride Cl^- and potassium K^+
b. chloride Cl^- and sodium Na^+
c. oxide O^{2-} and calcium Ca^{+2}
d. oxide O^{2-} and sulphide S^{2-}

6 - What is the similarity between metals and nonmetals?.....

a. Malleable and ductile
b. Tend to gain electrons in chemical reactions
c. The outermost energy levels in their atoms is not completely filled with electrons
d. Do not have metallic luster

7 - Four elements (X), (Y), (Z) and (W), their **atomic numbers** are 1, 10, 17 and 19.

Which **two elements** whose the **molecule** of each of them is composed of **two atoms**?

a. (X) and (Z) b. (Z) and (W) c. (X) and (W) d. (X) and (Y)

7 - Study the following figures, then answer :

1 - Which of the following figures represents :

1. A neutral nonmetal element (.....)
2. A nobel gas (.....)
3. A negative ion (.....)
4. A positive ion (.....)

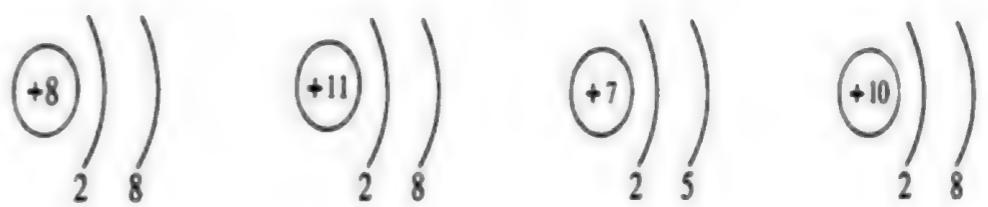


Fig. (a)

Fig. (b)

Fig. (c)

Fig. (d)

2 – The following figures represent some **atoms**, answer the following questions

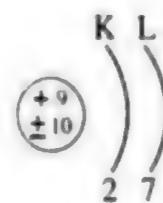


Fig. (a)

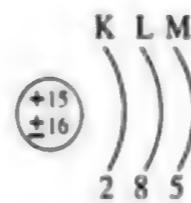


Fig. (b)

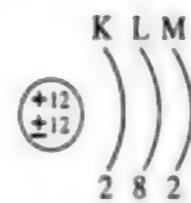


Fig. (c)



Fig. (d)

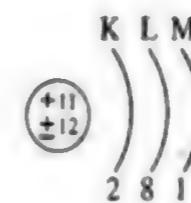


Fig. (e)

a. Find the kind of element and ion if present

b. Find the **number of electrons** lost or gained during the chemical reaction

c. Which of these atoms is a **good** conductor of **heat** and **electricity**

8 – Complete the following table :

9 – Mention one difference between :

1 – Na and Na^+

| Na | Na^+ |
|-------|---------------|
| | |

10 – Answer the following question :

Mention the **atomic number** and the **type of element** with drawing a diagram showing the **electronic configuration** for each **atom** of the following :

1. An element atom that gains two electrons in the **outermost energy level (L)** during the chemical reaction

.....
.....
.....
.....

2. An element atom whose electrons are **distributed in 4 energy levels** and its **ion** carries one **positive charge**

.....
.....
.....
.....
.....

3. An element atom whose **electrons distribute in 3 energy levels** and the **symbol** of its **ion** is (X^{-3})

.....
.....
.....
.....
.....

4. An element atom that **loses two electrons** during the chemical reaction, so **(M)** becomes the **outermost energy level** of its **ion**

.....
.....
.....
.....
.....

Fifth : Ionic bond and covalent bond

I – Compare between each of the following :

1 – Ionic bond and covalent bond

| P.O.C | Ionic bond | Covalent bond |
|--------------------------------|----------------|----------------|
| Definition | | |
| Type of elements | | |
| Way of formation | | |
| Its types | | |
| Type of the produced molecules | | |

2 – Write the scientific term for each of the following :

- 1 – A bond results from **electric attraction** between a **positive** and a **negative** ions
- 2 – A bond that is formed between **sodium** and **chlorine** atoms
- 3 – A bond that is formed between **magnesium** and **oxygen** atoms
- 4 – A bond that is formed between **two nonmetal elements** with **sharing of electrons**
- 5 – A bond resulting from the **participation** of each of the **two atoms** with **electrons**
- 6 – A bond resulting from the **participation** of each of the **two atoms** with **1 electron**
- 7 – A bond results from **two hydrogen atoms**, where each atom shares with **1 electron**

8 – A bond resulting from the **participation** of each of the **two atoms** with **2 electrons**

9 – A bond arises between **two oxygen atoms**, where each atom shares with **2 electrons**

10 – A bond resulting from the **participation** of each of the **two atoms** with **3 electrons**

11 – A bond results from **two nitrogen atoms**, where each atom shares with **3 electrons**

12 – The bond that is found between the **atoms of a water molecule**

3 – Complete the following statements :

1 – During the formation of **sodium chloride** molecule, $_{17}\text{Cl}$ atom.....**one electron** and **changes into**.....**ion**

2 – During the formation of **MgO** molecule,**atom loses**.....**electrons** which are **gained by**.....**atom**

3 –and.....are examples of **ionic compounds**

4 – **Covalent bonds** are formed among **two.....elements**

5 – In.....**bond**, the atoms **don't lose** or **gain** any electrons

6 – In **single** covalent bond, each atom.....with.....**electron** such as in.....andmolecules

7 – In **double** covalent bond, each atom.....with.....**electrons** such as in.....**molecule**

8 – In **triple** covalent bond, each atom.....with.....**electrons** such as in.....**molecule**

9 –is an example of **covalent compounds**

10 – The bond in **sodium chloride** is.....**bond**, whereas in **water molecule** is.....**bond**

11 – **Magnesium oxide** has.....**bond**, while **oxygen molecule** has.....**bond**

12 – **Oxygen atom**.....**two electrons** on the formation of **magnesium oxide molecule**, while it.....**two electrons** during the formation of **oxygen molecule**

4 - Give reason for each of the following :

1 – The bond in **sodium chloride (NaCl)** molecule is **an ionic bond**?.....

.....

2 – The bond in **magnesium oxide** (MgO) molecule is an **ionic bond**?

3 – The bond in **hydrogen** (H) molecule is **a single** covalent bond?

4 – The bond in **oxygen** (O) molecule is **a double** covalent bond?

5 – The bond in **nitrogen** (N) molecule is **a triple** covalent bond?

6 – The bond in **water molecule** (H_2O) is a **single** covalent (coordinate) bond?

7 – When an atom of **chlorine** (Cl) is **joined** with an atom of **sodium** (Na), the product will be an **ionic compound**, but when **two atoms** of chlorine are **joined** together, the product will be **a covalent compound**?

8 – **Ionic bonds** produce **compounds** only not elements, but the **covalent bonds** produce both types an **element** or even a **compound**?

5 - What happens when :

1 – **Chlorine atom** combines with **sodium atom**?

2 – **An electric attraction** occurs between **sodium ion** and **chloride ion**?

3 – **Oxygen atom** combines with **magnesium atom**?

4 – **An electric attraction** occurs between **magnesium ion** and **oxygen ion**?

5 – **Two oxygen atoms** combine **together**?

6 – A chlorine atom combines with a hydrogen atom?.....

6 - Put (✓) or (✗), then correct the false statement :

- 1 – Ionic bond arises between **two nonmetals** (.....)
- 2 – In **an ionic bond**, the **metal** atom gives electrons to the **nonmetal** atom (.....)
- 3 – The **bond** in sodium **chloride molecule** is a **single covalent bond** (.....)
- 4 – **Table salt** is **an ionic compound** (.....)
- 5 – **Magnesium oxide** is **an ionic compound** (.....)
- 6 – During the formation of magnesium oxide molecule, a **magnesium atom gains two electrons from oxygen atom** (.....)
- 7 – In **covalent bond**, the **two nonmetal atoms do not lose or gain electrons** (.....)
- 8 – The **bond in hydrogen molecule** is a **single covalent bond** (.....)
- 9 – The **bond in water molecule** is a **covalent bond** (.....)
- 10 – The **bond in oxygen molecule** is **double ionic bond** (.....)
- 11 – Each atom in **oxygen molecule** shares with **two electrons** (.....)
- 12 – The **bond in a nitrogen molecule** is a **triple covalent bond** (.....)

7 - Choose the correct answer :

- 1 – The **ionic bond** usually arises (originates) between.....elements
 - a. two metallic
 - b. two nonmetallic
 - c. metallic and noble
 - d. metallic and nonmetallic
- 2 – The **bond in sodium chloride and magnesium oxide molecules** are.....bond
 - a. ionic
 - b. single covalent
 - c. double covalent
 - d. triple covalent

3 – All the following are **ionic** compounds, **except**.....

4 - During the formation of **sodium chloride** molecule, **sodium atom**.....

- a. gains 1 electron from chlorine atom
- b. gives 1 electron to chlorine atom
- c. gains 2 electrons from chlorine atom
- d. gives 2 electrons to chlorine atom

5 - During the formation of **magnesium oxide** molecule, **oxygen** atom changes into...

- a. positive ion and carries one positive charge
- b. negative ion and carries one negative charge
- c. positive ion and carries two positive charges
- d. negative ion and carries two negative charges

6 – The **element** whose atomic number is.....forms an ionic bond with oxygen

7 – The **covalent** bond usually arises (originates) between.....elements

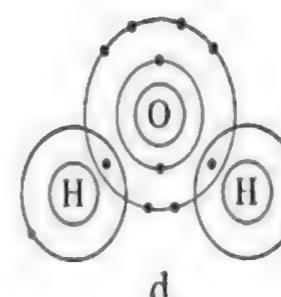
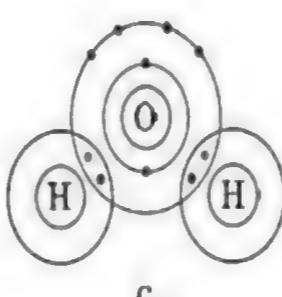
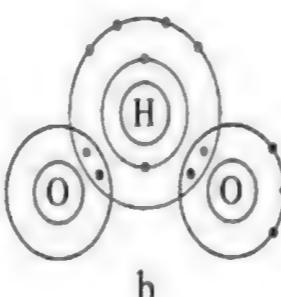
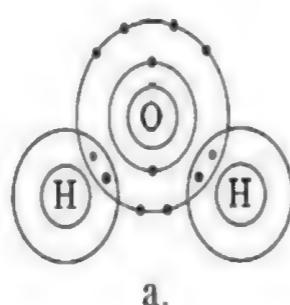
- a. two metallic
- b. two nonmetallic
- c. metallic and noble
- d. metallic and nonmetallic

8 – All the following are covalent compounds, **except**.....

a. H_2O b. H_2 c. KCl d. NH_3

9 - All the following are examples of **single** covalent bonds, **except**.....

10 – Which of the following figures represents the **water** molecule? Fig (.....)



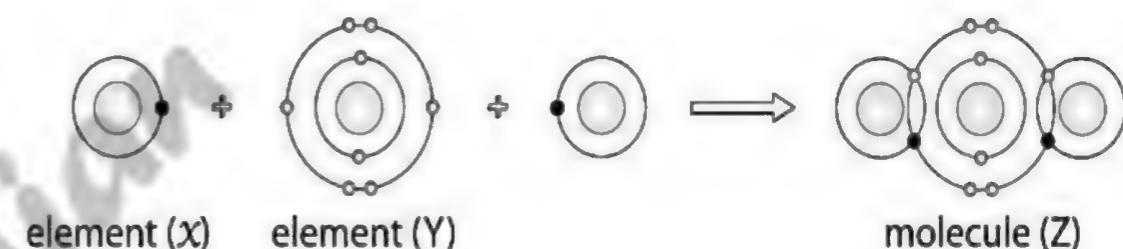
11 – Which of the following sentences is **true** about **bonding** in water molecule?.....

- a. Covalent bond due to transfer electrons from (H) atom to (O) atom
- b. Ionic bond due to transfer of electrons from (O) atom to (H) atom
- c. Single covalent bond between (O) atom and each (H) atom
- d. Ionic bond between (O) atom and (H) atoms

12 – The diagram shows the combination of **two atoms** of element (X) and **an atom** of element (Y) to form the **molecule** (Z)

- Which of the following is **correct**?.....

| | Number of protons in atom (X) | Atomic number of element (Y) | Type of bond in molecule (Z) |
|---|-------------------------------|------------------------------|------------------------------|
| a | 1 | 8 | Covalent |
| b | 2 | 8 | Covalent |
| c | 1 | 10 | Ionic |
| d | 2 | 8 | Ionic |



13 – The covalent bond in **an oxygen** molecule is a.....bond

- a. single
- b. double
- c. triple
- d. (a) and(b)

14 –is the symbol of **two oxygen molecules**

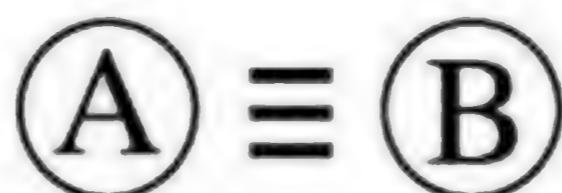
- a. O_2
- b. $2O_2$
- c. $2O$
- d. O

15 – There is a **triple covalent bond** in.....molecule

- a. hydrogen
- b. chlorine
- c. oxygen
- d. nitrogen

16 – The opposite diagram shows the **chemical bond** between two atoms (A) and (B).What are the **two atoms**?

| | Atom (A) | Atom (B) |
|---|----------|----------|
| a | N | H |
| b | O | O |
| c | N | N |
| d | H | O |



17 – Oxygen and nitrogen molecules are different in.....

- a. number of atoms in the molecule
- b. number of electrons shared by each atom
- c. state of element
- d. type of bond between atoms

8 – Choose the odd word out – write the scientific term :

1 – Nitrogen molecule – Table salt molecule – Hydrogen molecule – Oxygen molecule (.....)

The scientific term for others :

9 – Answer the following questions :

1 – Two elements $^{23}_{11}A$ and $^{35}_{17}B$: Mention :

- a. The type of each element
- b. The electronic configuration for each of them?
- c. The type of the bond formed between them? (Give reason) (show by drawing)

.....
.....
.....
.....
.....
.....
.....
.....

2 – Two elements (${}_8A$) and (${}_{12}B$)

- a. Which one is metal and which is nonmetal?
- b. What is the kind of bond formed between them? (Show by drawing)
- c. What is the type of formed compound?

.....
.....
.....
.....
.....
.....
.....
.....

3 - Two elements (X) and (Y) have atomic numbers (11 and 17) respectively

- a. Show by **drawing** the **chemical bond** is formed between them
- b. What is the **type** of this **bond**?
- c. What is the **kind** of each **element**?

4 – Draw a diagram showing the electronic configuration of the atom of oxygen (${}^8\text{O}^{16}$)

Then show how **two** of its atoms are bonded to form **oxygen molecule (O_2)**

5 - A, B, C and D are four elements, whose atomic numbers are (1, 11, 10 and 17) respectively

- a. **Classify them into metal, nonmetal and noble gas**
- b. **Show by drawing how two atoms of (A) form a covalent bond?**
- c. **What is the type of bond when (B) combines with (D)?**
- d. **What is the type of bond when two atoms of (D) combine together?**
- e. **Explain why element (C) doesn't undergo chemical reactions under normal conditions?**

10 – Study the following figures, then answer :

1 – The following figures represent three molecules, whose atoms combine together by **covalent bonds**



Fig. (a)



Fig. (b)

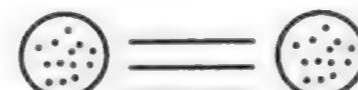


Fig. (c)

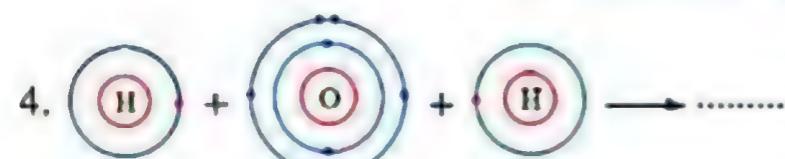
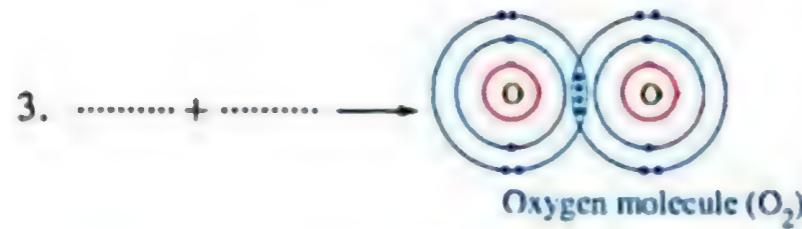
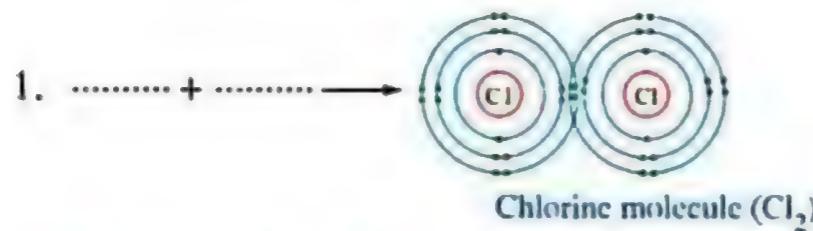
Which of the following figures represents :

1. Hydrogen molecule (.....)

2. Oxygen molecule (.....)

3. Nitrogen molecule (.....)

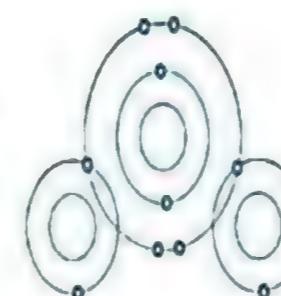
2 – Complete the following figures, then write the **kind** of the **bond** :



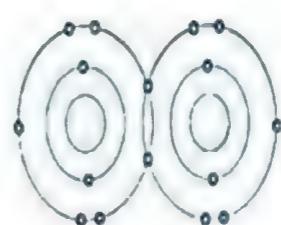
3 – Copy the following figures in your answer paper after **correcting** the **mistakes** :



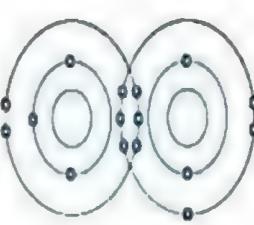
Fluorine molecule F_2



Water molecule H_2O



Oxygen molecule O_2



Nitrogen molecule N_2

THANK YOU

First : Valency

1 – Write the definition of each of the following :

1 – Valency :

2 – Write the scientific term for each of the following :

1 – Elements their valencies are zero

2 – The number of electrons that are gained, lost or even shared by an atom during the chemical reactions

3 – Mention an example for each of the following :

| | | | |
|--|---------|--|---------|
| 1 – A monovalent metallic element | (.....) | 7 – A trivalent nonmetallic element | (.....) |
| 2 – A divalent metallic element | (.....) | 8 – A tetravalent nonmetallic element | (.....) |
| 3 – A trivalent metallic element | (.....) | 9 – A pentavalent nonmetallic element | (.....) |
| 4 – A metallic element has more than one valency | (.....) | 10 – A hexavalent nonmetallic element | (.....) |
| 5 – A monovalent nonmetallic element | (.....) | 11 – A nonmetallic element has more than one valency | (.....) |
| 6 – A divalent nonmetallic element | (.....) | | |

4 – Choose the odd word – write the scientific term :

| | | |
|--|---------|---------|
| 1 – Lithium – Silver – Sodium – Aluminium | (.....) | (.....) |
| 2 – Oxygen – Iodine – Chlorine – Hydrogen | (.....) | (.....) |
| 3 – Bromine – Chlorine – Iodine – Potassium | (.....) | (.....) |
| 4 – Calcium – Magnesium – Lead – Oxygen | (.....) | (.....) |
| 5 – Phosphorus – Nitrogen – Sulphur – Chlorine | (.....) | (.....) |

5 – What is meant by each of the following :

- 1 – A trivalent metallic element?.....
- 2 – Magnesium (₁₂Mg) is a divalent element?.....
- 3 – Fe^{+3} ?.....
- 4 – A trivalent nonmetallic element?.....
- 5 – Oxygen (₈O) is a divalent element?.....

6 – Complete the following statements :

- 1 –elements **do not** participate in **chemical reactions** in **ordinary conditions** and their **valency** is.....
- 2 – The **valency of nobel gases** is.....as their **outermost energy shell** is.....with.....
- 3 – The **valency of metals** may be.....,.....or.....as their **outermost energy levels** have **1,2 or 3 electrons**
- 4 – The **valency of aluminium** is....., while that of **calcium** is.....
- 5 – Some **metallic elements** have **more than one** valency such as.....and.....
- 6 – The **valency of copper** may be.....or.....
- 7 – The **valency of iron** may be.....and is called.....or.....and is called.....
- 8 – The **valency of iron** is.....in **ferrous chloride**, while in **ferric chloride** is.....
- 9 – The **valency of fluorine and iodine** is....., while that of **oxygen** is.....
- 10 – The **valency of carbon** is.....
- 11 – Some **nonmetallic elements** have **more than one** valency such as.....,.....and.....
- 12 – The **valency of sulphur atom** may be.....,.....or.....

13 - Phosphorus element has two valencies which are.....and.....

7 - Give reason for each of the following :

1 - The valency of noble gases is zero?.....

2 - Magnesium (₁₂Mg) is divalent, while aluminium (₁₃Al) is trivalent?.....

3 - Chlorine (₁₇Cl) is a monovalent element, while oxygen (₈O) is divalent one?.....

4 - Potassium (₁₉K) is monovalent, while oxygen (₈O) is divalent?.....

8 - Put (✓) or (✗) then correct the false statement :

1 - Atomic group is the number of electrons lost or gained or even shared by an atom during the chemical reaction (.....)

2 - The valency of noble gas is monovalent (.....)

3 - An element of atomic number 20, so its valency is divalent (.....)

4 - Potassium (₁₉K) is monovalent, while oxygen (₈O) is divalent (.....)

5 - The symbol of zinc is (Zn) and it is monovalent (.....)

6 - The symbol of lead is (Ld) and it is divalent (.....)

7 - Iron has more than one valency (.....)

9 - Choose the correct answer :

1 - The valency of argon (₁₈Ar) is.....

- a. monovalent
- b. divalent
- c. trivalent
- d. zero

2 - The valency of helium (${}_2\text{He}$) is.....

- a. 0
- b. 1
- c. 2
- d. 4

3 - When an atom loses, gains or shares by **one** electron, its valency is.....

- a. monovalent
- b. divalent
- c. trivalent
- d. tetravalent

4 - When a **nonmetal** gains or shares by **two** electrons, its valency will be.....

- a. monovalent
- b. divalent
- c. trivalent
- d. tetravalent

5 - All the **following elements** are monovalent, except.....

- a. hydrogen
- b. sodium
- c. oxygen
- d. chlorine

6 - All the **following element** are divalent, except.....

- a. ${}_{12}\text{Mg}$
- b. ${}_{7}\text{N}$
- c. ${}_{8}\text{O}$
- d. ${}_{16}\text{S}$

7 - The valency of ferrous is.....

- a. monovalent
- b. divalent
- c. trivalent
- d. tetravalent

8 - All the **following** are **nonmetals** have **more than one** valency, except.....

- a. copper
- b. phosphorus
- c. nitrogen
- d. sulphur

9 - What is the **common property** of the **elements**, fluorine, chlorine, hydrogen and carbon?.....

- a. They are gaseous elements except carbon
- b. They are monovalent metals except carbon
- c. They are diatomic molecules except chlorine
- d. They are nonmetal elements except hydrogen

10 - Both **iron** and **nitrogen** are **similar** in.....

- a. are solid metals
- b. are divalent elements
- c. involve in the structure of acids
- d. have more than one valency

Second : **Atomic Groups**

1 – Write the definition of each of the following :

1 – Atomic group (radical) :.....

2 – Mention an example for each of the following :

1 – A monovalent atomic group (.....) 3 – A trivalent atomic group (.....)

2 – A divalent atomic group (.....) 4 – A positive atomic group (.....)

3 – Write the scientific term for each of the following :

1 – A set of atoms of different elements joined together and they behave like one atom during the chemical reaction, having special valency and don't exist solely

2 – The only positive atomic group

3 – The atomic group that has the same elements of water molecule

4 – Complete the following statements :

1 –and.....are examples of monovalent atomic groups, while..... and..... are examples of divalent atomic groups

2 –is a trivalent atomic group

3 – The only positive atomic group is.....

4 – The atomic group that has the same elements of water molecule is.....

5 – The difference between nitrate group and nitrite group is one.....atom

6 – The valency of carbonate group is....., while that of bicarbonate group is.....

7 – The symbol of phosphate group is.....and its valency is.....

8 – The valency of potassium (K) is....., while that of sulphate (SO_4) is.....

9 – The symbol of sulphate group is.....and it is formed of....atoms of.....different elements

5 - Give reason for each of the following :

1 – Both nitrate and carbonate groups have the same number of atoms, but differ in their valencies?.....

2 – Both nitrite and nitrate groups differ in the number of atoms and having the same valency?.....

6 - Put (✓) or (✗) then correct the false statement :

1 – The atomic group acts as a compound in the chemical reactions (.....)

2 – The chemical formula of carbonate group is $(\text{HCO}_3)^-$ (.....)

3 – Both nitrate and nitrite groups have the same valency (.....)

7 – Choose the correct answer :

1 – All the following are monovalent atomic groups, except.....

- a. phosphate
- b. nitrate
- c. hydroxide
- d. bicarbonate

2 – Which of the following is a trivalent atomic group?.....

- a. Hydroxide
- b. Sulphate
- c. Ammonium
- d. Phosphate

3 – The chemical formula (symbol) of carbonate group is.....

- a. $(\text{NO}_3)^-$
- b. $(\text{SO}_4)^{2-}$
- c. $(\text{NH}_4)^+$
- d. $(\text{CO}_3)^{2-}$

4 – The nitrate group is a.....radical (atomic group)

- a. monovalent
- b. divalent
- c. trivalent
- d. tetravalent

5 – All of these atomic groups carry the same charge, except.....

- a. nitrite
- b. nitrate
- c. bicarbonate
- d. ammonium

6 - The atomic group that is formed from the **same elements of water** is.....

- a. carbonate
- b. hydroxide
- c. sulphate
- d. nitrate

7 - Nitrate and nitrite groups are **different** in the.....

- a. types atoms
- b. number of atoms
- c. valency
- d. type of charge

8 - Phosphate and sulphate groups are **similar** in the.....

- a. type of atoms
- b. valency
- c. number of atoms
- d. (b) and (c)

8 - Choose the odd word – write the scientific term :

1 - Ammonium – Phosphate – Carbonate – Nitrate (.....) (.....)

THird : Chemical formula

1 – Write the definition of each of the following :

1 - Chemical formula :

.....

2 – What is meant by each of the following :

1 - The chemical formula of sodium chloride molecule is (NaCl)?

.....

2 - The chemical formula of water molecule is (H₂O)?

.....

3 – Write the scientific term for each of the following :

1 - A formula represents the number and the types of atoms in the molecule

4 - Write the - chemical formula - for these compounds :

| | | | | | |
|------------------------|---------|---------------------|---------|-----------------------------|---------|
| 1. Calcium chloride | (.....) | 7. Sodium oxide | (.....) | 13. Iron II (ferrous) oxide | (.....) |
| 2. Potassium chloride | (.....) | 8. Calcium oxide | (.....) | 14. Carbon monoxide | (.....) |
| 3. Sodium carbonate | (.....) | 9. Magnesium oxide | (.....) | 15. Carbon dioxide | (.....) |
| 4. Aluminium hydroxide | (.....) | 10. Aluminium oxide | (.....) | 16. Sulphur oxide | (.....) |
| 5. Sodium sulphate | (.....) | 11. Copper nitrate | (.....) | 17. Sulphur dioxide | (.....) |
| 6. Copper oxide | (.....) | 12. Copper sulphate | (.....) | 18. Sulphur trioxide | (.....) |

5 - Complete the following statements :

- 1 - The chemical formula of magnesium sulphate is....., while that of calcium nitrate is.....
- 2 - The chemical formula of sodium carbonate is.....and it consists of.....atoms of.....different elements
- 3 - Na_2O is the chemical formula of....., while the chemical formula of magnesium carbonate is.....
- 4 - The valency of calcium is.....and when it combines with phosphate group, a compound is formed its formula is.....
- 5 - The chemical formula of sodium bicarbonate is....., and it consists of..... atoms ofdifferent elements
- 6 - The chemical formula of calcium phosphate is....., and it consists of..... atoms ofdifferent elements
- 7 - In the chemical formula X_2Y_3 the number (3) represents the.....of X, but.....of Y
- 8 - If the formula of aluminium sulphate is $\text{Al}_2(\text{SO}_4)_3$, so the valency of aluminium atom is....., while the valency of sulphate group is.....
- 9 - The valency of sodium in sodium carbonate Na_2CO_3 is.....and its valency in sodium chloride NaCl is.....

6 - Give reason for each of the following :

- 1 - The chemical formula of sodium carbonate is Na_2CO_3 ?.....

2 - An oxygen atom joins two atoms of sodium when composing one molecule of sodium oxide?.....

7 - Put (✓) or (✗) then correct the false statement :

- 1 - The chemical formula indicates the type and the number of atoms in a molecule (.....)
- 2 - The chemical formula of calcium carbonate is CaCO_3 (.....)
- 3 - The chemical formula of aluminium sulphate is $\text{Al}_3(\text{SO}_4)_2$ (.....)
- 4 - The chemical formula of silver nitrates is AgNO_3 (.....)
- 5 - Both lithium bicarbonate and sodium carbonate have the same number of atoms(.....)
- 6 - The molecule of sodium sulphate consists of three different elements (.....)
- 7 - Water molecule consists of four atoms of two different elements (.....)
- 8 - The valency of sodium in NaCl is monovalent, while it is divalent in Na_2CO_3 (.....)
- 9 - In the compound (XY_2) , (Y) is a divalent and (X) is monovalent (.....)

8 - Choose the correct answer :

1 - The chemical formula indicates the.....in the compound

- a. number of atoms
- b. type of atoms
- c. number of element
- d. all the previous

2 - Element (M) form a compound $\text{M}(\text{OH})_3$, so its valency is.....

- a. monovalent
- b. divalent
- c. trivalent
- d. tetravalent

3 - In the compound $\text{X}(\text{NO}_3)_2$, the valency of element (X) is.....

- a. monovalent
- b. divalent
- c. trivalent
- d. tetravalent

Fourth : Chemical Compounds

1 – Write the definition of each of the following :

1 – Acids :
.....

2 – Bases (Alkalis) :
.....

3 – Oxides :
.....

4 – Salts :
.....

2 – Compare between each of the following :

1 – Acids and Bases (Alkalis)

| P.O.C | Acids | Bases |
|----------------------------|-------|-------|
| Its taste | | |
| The effect of litmus paper | | |
| Examples | | |

2 – Metal oxides and Nonmetal oxides

| P.O.C | Metal oxides | Nonmetal oxides |
|------------|--------------|-----------------|
| Definition | | |
| Examples | | |

3 – Soluble salts and insoluble salts

| P.O.C | Soluble salts | Insoluble salts |
|----------|-------------------------|-------------------------|
| Examples | | |

3 – Write the scientific term for each of the following :

- 1 – Substances dissociate in water producing **positive hydrogen ions** (H^+)
- 2 - Compounds have a sour taste and turns litmus paper into red
- 3 – Substance dissociate in water producing **negative hydroxide ions** (OH^-)
- 4 – Compounds have a bitter taste and turn litmus paper into blue
- 5 – Compounds that are resulted from the combination between **oxygen** and **an element** even though it is **a metal or non-metal**
- 6 – **Oxides** produced due to the combination of **oxygen** with a **metal**
- 7 – **Oxides** produced due to the combination of **oxygen** with a **nonmetal**
- 8 – Compounds that are found within the **components** of the Earth's crust or dissolved in **water of seas and oceans**
- 9 – Compounds that resulted from the **combination** of a **positive metal ion** (or a **positive atomic group**) with a **negative atomic group** (or a **negative nonmetal ion** except **oxygen ion**)

4 – Mention an example for each of the following :

| | | | |
|---|---------|--------------------------|---------|
| 1 – An acid contains oxygen | (.....) | 6 – A metal oxide | (.....) |
| 2 – An acid doesn't contain oxygen | (.....) | 7 – A nonmetal oxide | (.....) |
| 3 - A compound turns the blue litmus paper into red | (.....) | 8 – Water soluble salt | (.....) |
| 4 – A base (an alkali) | (.....) | 9 – Water insoluble salt | (.....) |
| 5 - A compound turns the red litmus paper into blue | (.....) | | |

5 – Write the - chemical formula - for these compounds :

| | | | |
|-----------------------|---------|------------------------|---------|
| 1. Table salt | (.....) | 6. Lead iodide | (.....) |
| 2. Sodium sulphide | (.....) | 7. Lead sulphate | (.....) |
| 3. Potassium sulphate | (.....) | 8. Sodium carbonate | (.....) |
| 4. Calcium nitrate | (.....) | 9. Potassium carbonate | (.....) |
| 5. Silver chloride | (.....) | 10. Ammonium carbonate | (.....) |

6 – Identify (mention) the - type - of the following compounds :

| | | | |
|----------------------------|---------|-----------------------------|---------|
| 1. KOH | (.....) | 7. HBr | (.....) |
| 2. NaCl | (.....) | 8. $\text{Ca}(\text{OH})_2$ | (.....) |
| 3. MgO | (.....) | 9. HNO_3 | (.....) |
| 4. H_2SO_4 | (.....) | 10. PbSO_4 | (.....) |
| 5. CO_2 | (.....) | 11. Al_2O_3 | (.....) |
| 6. NH_4Cl | (.....) | 12. CuSO_4 | (.....) |

7 – Complete the following table :

| The compound | Its name | Number of elements | Number of atoms | Its type |
|------------------------------|-----------|--------------------|-----------------|----------|
| CO_2 | ..... | ..... | ..... | ..... |
| NaNO_3 | ..... | ..... | ..... | ..... |
| $\text{Al}_2(\text{SO}_4)_3$ | ..... | ..... | ..... | ..... |
| ..... | Limewater | ..... | ..... | ..... |

| | | | | |
|-------------------|---------------------|-------|-------|-------|
| CaCO ₃ | ..... | ..... | ..... | ..... |
| ..... | Lithium bicarbonate | ..... | ..... | ..... |
| CaO | ..... | ..... | ..... | ..... |
| ..... | Caustic soda | ..... | ..... | ..... |
| ..... | Sulphuric acid | ..... | ..... | ..... |

8 – Complete the following statements :

1 – Compounds are classified according to their **properties** into....., **bases**,..... and.....

2 – On dissolving in water, acids give **positive**.....ions and alkali give **negative**.....ions

3 – We can use.....to distinguish between **acids** and **bases**

4 – Acids have.....**taste** and change the colour of litmus paper into....., while bases have.....**taste** and change the colour of litmus paper into.....

5 – The **symbol** of all mineral acids **begin** with.....**atom**, while the **symbol** of all **bases** end with.....**group**

6 –and.....are **examples of acids**, while.....and.....are **examples of bases**

7 – The **chemical formula** of hydrochloric acid is....., but the **chemical formula** of sodium hydroxide is.....

8 – The **symbol** of caustic soda is....., while that of limewater is.....and **both of them** are considered as.....

9 – H₂SO₄ is....., while NaOH is.....

10 – The **chemical formula** of water is....., but that of sulphuric acid is.....

11 –is from acids that contain **oxygen**, whiledoesn't contain **oxygen**

12 –is **an example of metal oxides**, whileis **an example of nonmetal oxides**

13 – The **valency** of copper in Cu₂O is....., while in CuO is.....

14 – **Salts** exist within the **components** of the.....or **dissolved** in water of..... and.....

15 – Salts are produced as a result of combination of a **positive metal ion** with **negative**or **negative****except**.....ion

16 – All of **negative ions** form.....**except**, **negative**.....ion

17 - Salts are variant in **some** of their properties such as....., smell and.....in water

18 - Sodium sulphate is from salts that.....in water, while lead sulphate is from the salts that.....in water

19 - All of carbonate salts.....dissolve in water except, sodium carbonate,..... and.....

9 - Give reason for each of the following :

1 - All acids turn the colour of litmus to be **red** and having a **sour** taste, while all **bases** turn the colour of litmus to be **blue**?

2 - Acids have effect on litmus paper which is **different** from **bases**?

3 - Aluminium oxide is a **metal oxide**, while sulphur trioxide is a **nonmetal oxide**?

4 - We **can** obtain **sodium chloride solution** not **silver chloride solution**?

5 - Caustic soda is from **bases**, while lead bromide is from **salts**?

10 - Put (✓) or (✗) then correct the false statement :

1 - Compounds are divided according to their properties and electronic structure into acids, bases oxides and salts (.....)

2 - Oxides are substances that dissociate in water producing positive hydrogen ion (.....)

3 - Salts are substances that dissociate in water producing negative hydroxide ions (OH^-) (.....)

4 - Mineral acids are formed when hydrogen joined with a negative atomic group except nitrate group (.....)

5 - Acids turn red litmus paper into blue, while bases turn it into red (.....)

6 - The chemical formula of calcium hydroxide is CaOH (.....)

7 - H_2SO_4 and NaOH are considered acids (.....)

8 - Caustic soda and limewater are considered alkali (.....)

9 - Sodium hydroxide changes the colour of litmus paper into red (.....)

10 – Sulphur trioxide (SO_3) is from metal oxides (.....)

11 – SO_2 is the symbol of sodium oxide (.....)

12 – Sodium chloride is considered a base (an alkali) (.....)

13 – Sodium chloride is a water soluble salt, while silver chloride is insoluble salt (.....)

14 – Sodium carbonate, potassium carbonate and ammonium carbonate are soluble in water (.....)

II – Choose the correct answer :

1 – When an acid dissolves in water, it produces.....ions

a. $(\text{OH})^+$ b. H^- c. H^+ d. $(\text{OH})^-$

2 – Mona bought a cup of yogurt and found the taste is sour, so she concluded that it contains a compound from.....

a. acids b. bases c. salts d. oxides

3 – Combination of hydrogen with a negative atomic group produces.....

a. an acid b. an oxide c. a base d. a salt

4 – The chemical formula of sulphuric acid is.....

a. H_2O b. HCl c. H_2SO_4 d. HNO_3

5 – All of these substances turn litmus paper into red, except.....

a. HCl b. HNO_3 c. NaOH d. H_2SO_4

6 – Acids can contain any of the following negative atomic groups, except.....

a. ammonium group b. hydroxide group c. carbonate group d. sulphate group

7 – When an alkali (base) dissolves in water, it gives.....ions

a. $(\text{OH})^+$ b. H^- c. $(\text{OH})^{-2}$ d. $(\text{OH})^-$

8 – The chemical formula of sodium hydroxide is.....

- a. NaOH
- b. NaCO_3
- c. NaHCO_3
- d. $\text{Na}_2(\text{CO}_3)_2$

9 – All of these substances turn litmus paper into **blue**, **except**.....

- a. NaOH
- b. KOH
- c. $\text{Ca}(\text{OH})_2$
- d. HBr

10 – All of the aqueous solutions of the following compounds have **bitter** taste, **except**..

- a. sodium hydroxide
- b. sulphuric acid
- c. calcium hydroxide
- d. potassium hydroxide

11 – **Caustic soda** is one of the.....

- a. oxides
- b. salts
- c. acids
- d. alkalis

12 – What is the **chemical name of caustic soda**?.....

- a. Magnesium hydroxide $\text{Mg}(\text{OH})_2$
- b. Calcium hydroxide $\text{Ca}(\text{OH})_2$
- c. Sodium hydroxide NaOH
- d. Potassium hydroxide KOH

13 – What is the **chemical name of limewater**?.....

- a. Magnesium hydroxide $\text{Mg}(\text{OH})_2$
- b. Calcium hydroxide $\text{Ca}(\text{OH})_2$
- c. Sodium hydroxide NaOH
- d. Potassium hydroxide KOH

14 – The **molecules** of sodium hydroxide, water and sulphuric acid share in the **presence (existence)** of.....of each of them

- a. hydrogen and nitrogen
- b. hydrogen and oxygen
- c. oxygen and sodium
- d. hydrogen and sodium

15 – All of these are **nonmetal oxides**, **except**.....

- a. CO_2
- b. P_2O_5
- c. SO_3
- d. Al_2O_3

16 – Which of the following formulae are correct for **copper oxides**?.....

- a. CuO and CuO_2
- b. Cu_2O and CuO
- c. CuO and CuO_3
- d. Cu_2O_3 and Cu_2O

17 – Sodium chloride is.....

- a. an acid
- b. an oxide
- c. a base
- d. a salt

18 – Which of the following **ions** combine together to form a **salt**?.....

- a. negative chloride ion with positive hydrogen ion
- b. negative sulphate group with positive atomic group
- c. negative hydroxide group with positive sodium ion
- d. negative hydroxide group with positive hydrogen ion

19 – The **salt** that is formed from the combination of a **positive metal ion** with a **negative atomic group** is.....

- a. NaCl
- b. $(\text{NH}_4)_2\text{SO}_4$
- c. NaBr
- d. Na_2CO_3

20 – The **salt** that is formed from the combination of a **positive atomic group** with a **negative atomic group** is.....

- a. NH_4Cl
- b. $(\text{NH}_4)_2\text{CO}_3$
- c. Na_2SO_4
- d. NH_4Br

21 – Ammonium chloride salt is formed on the **combination (union)** of.....

- a. a positive metal ion with negative atomic groups
- b. a positive metal ion with negative nonmetal ion
- c. a negative nonmetal ion with a positive atomic group
- d. a negative nonmetal ion with a negative nonmetal ion

22 – On the combination of (Mg^{+2}) ion with (CO_3^{-2}) group,.....is formed

- a. an acid
- b. a base
- c. an oxide
- d. a salt

23 – All the following substances **affect** the colour of litmus paper, **except**.....

- a. HCl
- b. NaOH
- c. NaCl
- d. H_2SO_4

24 – From **soluble (dissolved)** salts in water is.....

- a. NaCl
- b. AgNO_3
- c. PbI_2
- d. PbSO_4

25 – One of the **insoluble** salts is.....

- a. Na_2S
- b. NaCl
- c. PbSO_4
- d. K_2SO_4

26 - All of **negative ions** form salts, except.....ion

- a. oxygen
- b. nitrogen
- c. chlorine
- d. bromine

12 - Choose the odd word - write the scientific term :

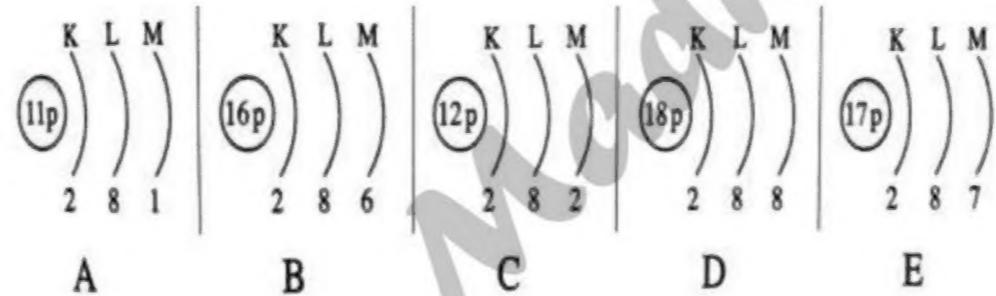
1 - NaOH - $\text{Ca}(\text{OH})_2$ - KOH - HCl (.....) (.....)

2 - Al_2O_3 - SO_3 - SO_2 - CO_2 (.....) (.....)

3 - NaCl - K_2SO_4 - AgCl - Na_2S (.....) (.....)

13 - Answer the following questions :

1 - Choose the suitable diagram for each of the following :



- a. A divalent **metallic** element (.....)
- b. A divalent **nonmetallic** element (.....)
- c. A **nobel gas** (.....)
- d. A monovalent **nonmetallic** element (.....)
- e. A monovalent **metallic** element (.....)

2 - If you have an element ${}_{19}^{39}\text{X}$

- a. Mention its **kind**? Why?
- b. Mention its **valency**? (Give reason)
- c. Write the **chemical formula** of its **oxide**
- d. **Complete** : it combines with **sulphate** group to give.....salt

3 - From the following formula (H, K, SO_4 , OH), Form :

- a. A **chemical formula** for an **acid**.....
- b. A **chemical formula** for a **base**.....
- c. A **chemical formula** for a **salt**.....

4 - Two elements (X) and (Y), their atomic numbers are 11 and 17 respectively. answer the following questions:

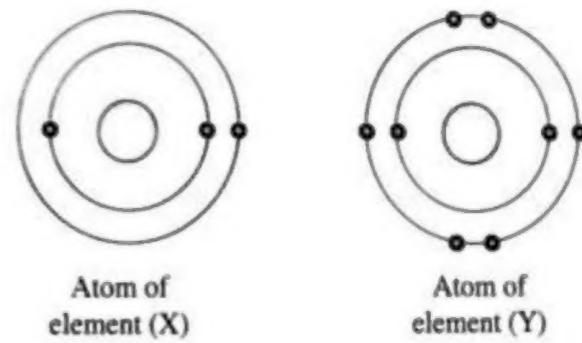
- Write the **electronic distribution** of each one :.....
- What is the **valency** of each one? (Give reason) :.....
- What is the **type** of each element?.....
- What is the **type** of the **bond** resulted from their combination?.....
- What is the **type** of the **compound** resulted from their combination?.....

5 - A compound has a chemical formula ZCl_2 , where the **electrons** of the element (Z) are distributed in 3 energy levels. Deduc the following :

- The **type** of **element** (Z) and why?
- The **type** of its **ion** and why?
- The **number** of **electrons** and **protons** of its **ion**?

6- From the opposite figure, when the **element** (X) combines with **element** (Y), this **produces compound** its **chemical formula** is.....

- XY
- XY_2
- X_2Y
- X_6Y



7 - Study the opposite diagram, then answer :

- Write the **names** of element (A) and (B)
- Mention** the **valency** of the two element? (G.R)
- Write the **name** and the **chemical formula** of the **compound** which is produced from the combination between element (A) and element (B)

